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*Compliments of
F. Cranefield,
Secretary Ws. State Hort. Society.*

**DEPARTMENT OF HORTICULTURE
COLLEGE OF AGRICULTURE
UNIVERSITY OF WISCONSIN
MADISON 6, WISCONSIN**

Wisconsin State Horticultural Society



Exhibit of Wisconsin State Horticultural Society at State Fair, Milwaukee, Sept. 11-15, 1906.

ANNUAL REPORT

OF THE

Wisconsin State Horticultural
Society

FOR THE YEAR 1906.

VOL. XXXVI.

F. CRANEFIELD, *Secretary.*

MADISON, WIS.



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1906.

LETTER OF TRANSMITTAL.

MADISON, Wis., March 1, 1906.

To His Excellency, JAMES O. DAVIDSON,

Governor of Wisconsin.

DEAR SIR:—I have the honor to transmit to you herewith the Thirty-sixth Annual Report of the Wisconsin State Horticultural Society.

Respectfully,

FREDERIC CRANEFIELD,

Secretary.

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CONSTITUTION AND BY-LAWS.

CONSTITUTION.

Article I. This society shall be known as the Wisconsin State Horticultural Society.

Article II. Its object shall be the advancement of the art and science of horticulture throughout the state.

Article III. Its members shall consist of annual members paying an annual fee of one dollar excepting that paid members of local societies may become members on payment of an annual fee of fifty cents, of life members paying a fee of five dollars. Wives of such members shall be entitled to the privileges of full membership; of honorary annual members who may by vote be invited to participate in the proceedings of the society and honorary life members who shall be distinguished for merit in horticulture and kindred sciences or who shall confer any particular benefit upon the society.

Article IV. Its officers shall consist of a President, Vice-President, Secretary, Treasurer, and an Executive Committee, consisting of the foregoing officers and additional members, one from each congressional district of the state, five of whom shall constitute a quorum at any of its meetings. All above officers, except Secretary, shall be elected by ballot, and shall hold office for one year thereafter, and until their successors are elected. The Secretary shall be appointed by the Executive Committee at the annual meeting, after the election of officers, and shall hold office for one year thereafter, or until his successor is appointed.

Article V.. The additional members of the Executive Committee may be elected by the local horticultural societies of their respective districts in the following manner: Each of the county or local societies of the different districts shall, at a regular meeting, elect a delegate who shall have authority to cast the vote of said society; these delegates shall meet in convention at least 15 days previous to date of annual meeting of this society and vote by ballot for member of Executive Committee; and if a member of such committee is not elected from

any congressional district the vacancy may be filled by vote of two-thirds of the members present at the annual meeting.

Article VI. The term "County and local horticultural societies" shall include any organization that shall have for its sole object the advancement of the interests of its members in the growing or sale of horticultural crops; provided, that such society acts by authority of a regularly adopted constitution and makes an annual report to the Secretary of the state society.

Article VII. The society shall hold its annual meeting for the election of officers, exhibition of fruits and discussions, in Madison, commencing on the first Tuesday of February of each year and such other meetings and at such time and place as the Executive Committee may direct.

Article VIII. The President, Treasurer, and Secretary shall constitute a Board of Managers which may conduct any business deemed necessary for the society in the absence of the Executive Committee. All bills against the society must be audited by the Board of Managers before being paid.

Article IX. This constitution, with the accompanying by-laws, may be amended at any regular meeting by a two-thirds vote of the members present.

BY-LAWS.

I. The President shall preside at meetings, and, with the advice of the Secretary, call all meetings of the society, and have general supervision of the affairs of the society, and shall deliver an annual address upon some subject connected with horticulture.

II. The Vice-President shall act in the absence or disability of the President, and perform the duties of the chief officer.

III. The Secretary shall attend to all the correspondence, shall record the proceedings of the society, preserve all papers belonging to the same, and superintend the publication of its reports. He shall also present a detailed report of the affairs of the society at its annual meeting. He shall also endeavor to secure reports from the various committees, and from local societies of the condition and progress of horticulture in the various districts of the state, and report the same to the society. He shall also be Superintendent of all Trial Orchards. It shall be the duty of the Secretary to make a report to the governor of the state of the transactions of the society, according to the provisions of the statutes for state reports.

IV. The Superintendent of Trial Orchards shall supervise the planting and cultivation of the trial orchards and trial stations and shall exercise general control of the same, subject to the directions of the Trial Orchard Committee.

V. The Treasurer shall keep an account of all moneys belonging to the society and disburse the same on the written order of the President, countersigned by the secretary, and shall make an annual report of the receipts and disbursements, and furnish the Secretary with a copy of the same on or before the first day of the annual meeting. The Treasurer elect shall, before entering upon the discharge of the duties of his office, give good and sufficient bonds for the faithful performance of his duties subject to the approval of the Executive Committee.

VI. The Executive Committee may manage all the affairs of the society and fill all vacancies in the board of officers; meetings of the committee may be called by the President, the Secretary or by the Secretary on written request of five members.

VII. Regular meetings of the Board of Managers shall be held bimonthly to audit accounts and transact other business; special meetings may be called by any member of the Board.

VIII. The standing committees of this society shall be as follows:

1st. Committee on Finance, consisting of three members.

2d. Committee on Nomenclature and New Fruits, consisting of three members.

3d. Committee on Trial Orchards and Trial Stations, consisting of three members, and such other committees as may be determined from time to time to be necessary. Said committees to be appointed annually by the President.

IX. It shall be the duty of the Finance Committee to settle with the Treasurer and to examine and report upon all bills or claims against the society which may have been presented and referred to them.

X. The Trial Orchard Committee shall have general control of the locating, planting and care of all trial orchards or trial stations, and shall visit collectively each orchard or station once each year or oftener if deemed necessary. Meetings of the committee may be called at any time by the President of the society or by the Superintendent of Trial Orchards.

MEMBERSHIP ROLL.

LIFE MEMBERS.

Allis, Frank W.....	Madison, Wis.
Ames, W. L.....	Oregon, Wis.
Ayer, Ed. E.....	Lake Geneva, Wis.
Babcock, O. W.....	Omro, Wis.
Barnes, A. D.....	Waupaca, Wis.
Brown, F. G.....	Madison, Wis.
Buckstaff, D. C.....	Oshkosh, Wis.
Bussey, W. P.....	Omro, Wis.
Cashman, Thos. E.....	Owatonna, Minn.
Carpenter, L. A.....	Fond du Lac, Wis.
Carver, N. E.....	Bayfield, Wis.
Chandler, S. S., Jr.....	Waupaca, Wis.
Chappel, F. H.....	Oregon, Wis.
Coe, R. J.....	Ft. Atkinson, Wis.
Cole, W. B.....	Pleasant Prairie, Wis.
Converse, D. C.....	Ft. Atkinson, Wis.
Eaton, B. A.....	S. Milwaukee, Wis.
Edwards, F. C.....	Ft. Atkinson, Wis.
Fiebing, J. H.....	Milwaukee, Wis.
Foley, M. F.....	Baraboo, Wis.
France, N. E.....	Platteville, Wis.
Guilford, W. S.....	Pecatonica, Ill.
Hager, W. S.....	West De Pere, Wis.
Hanchett, W. H.....	Sparta, Wis.
Harden, F. A.....	Weyauwega, Wis.
Harris, N. W.....	Lake Geneva, Wis.
Harland, F. W.....	Milwaukee, Wis.
Herbst, J. L.....	Sparta, Wis.
Hudnall, Geo. B.....	Superior, Wis.
Hutchinson, C. L.....	Lake Geneva, Wis.
Johnson, Franklin.....	Baraboo, Wis.
Jones, John D.....	Elk Grove, Wis.

Jones, G. D.	Wausau, Wis.
Kellogg, L. G.	Ripon, Wis.
Kellogg, Geo. J.	Lake Mills, Wis.
Kellogg, M. S.	Janesville, Wis.
Kierstead, E. H.	Oregon, Wis.
Kreutzer, A. L.	Wausau, Wis.
Loop, A. J.	North East, Penn.
Loope, T. E.	Eureka, Wis.
Malde, O. G.	Madison, Wis.
Marshall, S. H.	Madison, Wis.
Menn, J. J.	Norwalk, Wis.
McGregor, E. L.	Appleton, Wis.
Raymer, Geo.	Madison, Wis.
Rentschaler, F.	Madison, Wis.
Rietbrock, Fred.	Milwaukee, Wis.
Riordan, D. E.	Eagle River, Wis.
Ryerson, M. A.	Lake Geneva, Wis.
Saxe, Arthur.	Whitewater, Wis.
Seubert, John.	Cologne, Minn.
Simonson, Andrew.	Racine, Wis.
Smith, Irving.	Green Bay, Wis.
Steele, W. H.	Pewaukee, Wis.
Taylor, Will L.	Mt. Hope, Wis.
Tilson, Mrs. Ida.	West Salem, Wis.
Toole, W. A.	Baraboo, Wis.
Toole, William.	Baraboo, Wis.
Underwood, J. M.	Lake City, Minn.
Vaughn, B.	Grand Rapids, Wis.
Webb, W. H.	Superior, Wis.
Williams, Daniel.	Oconomowoc, Wis.
Wright, Arthur.	Milwaukee, Wis.

HONORARY LIFE MEMBERS.

Bailey, Prof. L. H.	Ithaca, N. Y.
Case, F. W.	Chicago, Ill.
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Trelease, Prof. Wm.	St. Louis, Mo.

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Barlow, Geo.....	Lake Geneva, Wis.
Barret, Miles.....	Lake Geneva, Wis.
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Beach, S. A.....	Ames, Iowa.
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Bennet, A. E.....	Grand Rapids, Wis.
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Fleming, Frank	Lake Geneva, Wis.
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Howlett, Mrs. D. D.	Oshkosh, Wis.
Hurry, Wm.	Lake Geneva, Wis.
Ihrig, J. J.	Oshkosh, Wis.
Illenberger, H. W.	Lake Geneva, Wis.
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Laue, A. F.	Milwaukee, Wis.
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Loope, Eva.	Eureka, Wis.
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Madison, Chris.	Lake Geneva, Wis.
Marsh, Thomas.	Waunakee, Wis.
Marshall, W. S.	Madison, Wis.
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Menn, Ella.	Norwalk, Wis.
Mexner, J. W.	De Forest, Wis.
Millar, Fred.	Lake Geneva, Wis.
Miller, Luther.	Chicago, Ill.
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Milward, J. G.	Madison, Wis.

Mitchell, Jas.	Lake Geneva, Wis.
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Moyle, W. J.	Union Grove, Wis.
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Niles, Raymond	Lake Geneva, Wis.
Nourse, H.	Bayfield, Wis.
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Ovenden, Frank	Madison, Wis.
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Palmer, L. H.	Baraboo, Wis.
Palmer, J. S.	Baraboo, Wis.
Park, W. J.	Madison, Wis.
Parsons, W. A.	Ft. Atkinson, Wis.
Parsons, A. A.	Omro, Wis.
Paulson, J. E.	Manitowoc, Wis.
Payton, A. J.	Oshkosh, Wis.
Pearson, C. L.	Baraboo, Wis.
Peck, Wm.	Baraboo, Wis.
Pelton, Geo.	Reedsburg, Wis.

Peterson, Chas. A.	Orange, Wis.
Peterson, P. A.	Poplar, Wis.
Pfeiffer, A. F.	West Bend, Wis.
Philipson, C.	Oshkosh, Wis.
Planta, R. F.	Milwaukee, Wis.
Post, Lewis.	Madison, Wis.
Post, Lawrence.	Mt. Horeb, Wis.
Pride, C. A.	Milwaukee, Wis.
Proudfit, A. E.	Madison, Wis.
Quinn, Michael.	Lake Geneva, Wis.
Ramsey, Mrs. Robt.	Baraboo, Wis.
Rastall, Benj.	Viola, Wis.
Ray, Joseph.	Madison, Wis.
Read, Geo. A.	Lake Geneva, Wis.
Redeling, Henry.	Marinette, Wis.
Réek, Joseph.	Madison, Wis.
Reinen, C. C.	Sun Prairie, Wis.
Reis, John.	Ithaca, Wis.
Reeve, J. S.	Appleton, Wis.
Remington, R. R.	Baraboo, Wis.
Rentschler, Geo.	Madison, Wis.
Reupke, Albert.	Lake Geneva, Wis.
Richardson, C. L.	Chippewa Falls, Wis.
Riegle, G. W.	Madison, Wis.
Riley, James.	Bloom City, Wis.
Roe, J. W.	Oshkosh, Wis.
Rosenow, Henry E.	Oconomowoc, Wis.
Rosenow, Arthur.	Oconomowoc, Wis.
Rouse, Mrs. Nelson.	Oshkosh, Wis.
Rundell, B. L.	Livingstone, Wis.
Rusta, C. O.	Blue Mounds, Wis.
Ryall, B. R.	Grand Rapids, Wis.
Ryan Sam J.	Appleton, Wis.
Sampson, Robt. J.	Lake Geneva, Wis.
Sandegard, Chris.	Lake Geneva, Wis.
Sandell, Harvey.	Madison, Wis.
Sandgren, Ed.	Lake Geneva, Wis.
Sandsten, E. P.	Madison, Wis.
Schilt, Peter.	Lake Geneva, Wis.
Searing, A. G.	Ashland Jct., Wis.
Shephard, Geo.	Lake Geneva, Wis.
Sidney, J. A.	Poplar, Wis.
Simon, H.	Baraboo, Wis.
Simonson, L. A.	Baraboo, Wis.
Skewes, E. B.	Union Grove, Wis.

Skinner, E. B.	Madison, Wis.
Skinner, Mrs. Lloyd	Madison, Wis.
Sligh, John	Lake Geneva, Wis.
Slaby, E. G.	Madison, Wis.
Smith, B. H.	Tiffany, Wis.
Smith, S. S.	Green Bay, Wis.
Smith, G. B.	Green Bay, Wis.
Smith, Mrs. J. Q.	Madison, Wis.
Smith, A. J.	Lake Geneva, Wis.
Soblie, Jos.	Lake Geneva, Wis.
Sperbeck, M. V.	Oshkosh, Wis.
Sprague, Theo. J.	Eagle, Wis.
Spry, John	Ft. Atkinson, Wis.
Stark, Frank	Randolph, Wis.
Stiehl, C. J.	Black River Falls, Wis.
Stoonsland, Halle	Madison, Wis.
Steinman, Henry J.	Milwaukee, Wis.
Stephens, J. W.	Fond du Lac, Wis.
Straka, E. E.	Kellnersville, Wis.
Spaulding, C. F.	Oconomowoc, Wis.
Sumner, Ed	Madison, Wis.
Swartz, John F.	Kenosha, Wis.
Swenholz, Jonas	Madison, Wis.
Tamblingson, R.	Ft. Atkinson, Wis.
Telfer, Joe	Ft. Atkinson, Wis.
Ten Eyck, A. A.	Brodhead, Wis.
Thrall, W. E.	Omro, Wis.
Thwaites, Mrs. R. G.	Madison, Wis.
Tice, Jess	Waunakee, Wis.
Tifft, Geo. L.	Milwaukee, Wis.
Tiplady, John	Lake Geneva, Wis.
Timms, C. J.	Ripon, Wis.
Tittemore, J. N.	Oshkosh, Wis.
Tollman, Henry	Lake Geneva, Wis.
Tomkins, W. M.	Ashland, Wis.
Topolinsky, John	Lake Geneva, Wis.
Treleven, Jos. D.	Omro, Wis.
Trowbridge, Geo.	Lake Geneva, Wis.
Turnquist, Aug.	Bayfield, Wis.
Turtle, Henry	Lake Geneva, Wis.
Turville, Thomas	Madison, Wis.
Tuttle, H. B.	Valley Jct., Wis.
Umlauff, Rudolph	Dorchester, Wis.
Updike, E. G.	Madison, Wis.
Utter, Delbert	Caldwell, Wis.

Vivian, Fred.....	Mineral Point, Wis.
Von Lanyl, Oscar.....	Neillsville, Wis.
Voss Heinrich J.....	Lake Mills, Wis.
Walker, Geo.....	Sawyer, Wis.
Wallin, Austin.....	Madison, Wis.
Walstead, Wm.....	Lake Geneva, Wis.
West, John B.....	Whitewater, Wis.
Weyerhorst, H. C.	Oshkosh, Wis.
Whittlesey, S. N.	Cranmoor, Wis.
Wilder, A. P.	Madison, Wis.
Wilkins, A. P.	Delavan, Wis.
Williams, Norman G.	Shiocton, Wis.
Williamson, W. D.	Madison, Wis.

OFFICERS AND COMMITTEES FOR 1906.

President, T. E. Loope.....	Eureka
Vice-President, R. J. Coe.....	Ft. Atkinson
Treasurer, L. G. Kellogg.....	Ripon
Secretary, F. Cranefield.....	Madison

EXECUTIVE COMMITTEE.

T. E. Loope, Chairman.....	Ex-Officio
R. J. Coe.....	Ex-Officio
L. G. Kellogg.....	Ex-Officio
F. Cranefield.....	Ex-Officio
1st Dist., Alex. Johnson.....	Lake Geneva
2nd Dist., S. H. Marshall.....	Madison
3rd Dist., Wm. Toole.....	Baraboo
4th Dist., F. W. Harland.....	Milwaukee
5th Dist., Henry Melcher.....	Oconomowoc
6th Dist., L. A. Carpenter	Fond du Lac
7th Dist., J. J. Menn.....	Norwalk
8th Dist., W. P. Bussey.....	Omro
9th Dist., Irving Smith.....	Green Bay
10th Dist., R. B. Johns.....	Wausau
11th Dist., C. L. Richardson.....	Chippewa Falls

COMMITTEE ON FINANCE.

Irving C. Smith.....	Green Bay
M. V. Sperbeck.....	Oshkosh
J. J. Menn.....	Sparta

COMMITTEE ON TRIAL ORCHARDS.

R. J. Coe, Ft. Atkinson, Term Expires.....	Feb., 1909
W. J. Moyle, Union Grove, Term Expires.....	Feb., 1908
D. E. Bingham, Sturgeon Bay, Term Expires.....	Feb., 1907

SUPERINTENDENT OF TRIAL ORCHARDS FOR 1906.

The Secretary.

TRIAL ORCHARDS.

Wausau.....	Marathon County
Eagle River.....	Vilas County
Medford.....	Taylor County
Poplar.....	Douglas County
Barron.....	Barron County

LISTS OF FRUITS RECOMMENDED FOR CULTURE IN WISCONSIN.*

APPLES.

Alexander, Astrachan (Red), Ben Davis, Dominion, Fall Orange, Fameuse (Snow), Golden Russett, Haas, Hibernal, Lowland Raspberry, Longfield, McIntosh, Malinda, McMahan, Newell, Northwestern Greening, Oldenburg (Duchess), Patten Greening, Perry Russett, Pe-waukee, Plumb Cider, Scott, Tolman (sweet), Utter, Wealthy, West-field (Seek-no-further), Willow Twig, Windsor, Wolf River, Yellow, Transparent.

FIVE VARIETIES FOR FARM ORCHARD.

Lowland Raspberry, Northwestern Greening, Oldenburg (Duchess), Plumb Cider, Wealthy.

CRABS.

Hyslop, Lyman, Martha, Sweet Russet, Whitney.

PLUMS.

Of the three classes of plums commonly cultivated, viz., European, Japanese, and Native or American, the last named is the most reliable.

NATIVE.

De Soto, Forest Garden, Hammer, Ocheeda, Quaker, Surprise, Wy-ant.

EUROPEAN.

Lombard, Moore's Arctic, Reine Claude (Green-gage).

*The behavior of varieties of fruits is influenced very largely by environment. The conditions of soil, exposure and latitude over such an area as the state of Wisconsin vary greatly and no list can be given that will prove satisfactory in all localities. The following provisional lists were prepared jointly by the Committee on Revision of Fruit Lists and the Secretary. Hardiness of plant and fruit bud has been the leading thought in the selection of varieties.

The "Fruit Lists" which appeared in former volumes have been abandoned. For technical descriptions of varieties leading to the identification of specimens the reader is referred to the "Catalogue of Fruits," issued by the American Pomological Society.

JAPANESE PLUMS.

Abundance, Burbank, Red June.

CHERRIES.

Early Richmond, Montmorency.

GRAPES.

Brighton, Concord, Delaware, Diamond, Green Mountain, Moore's
Early, Worden. /

BLACKBERRIES.

Badger, (Ancient) Briton, Eldorado, Snyder.

STRAWBERRIES.

Varieties starred have imperfect flowers and must not be planted alone.

Bederwood, *Crescent, Clyde, Dunlap, Enhance, Gandy, Glen Mary,
*Haverland, Lovett, *Sample, Splendid, *Warfield.

TWO VARIETIES OF STRAWBERRIES FOR THE FARM GARDEN.

Dunlap, *Warfield.

RASPBERRIES.

Black: Conrath, Gregg, Kansas.
Red: Cuthbert, Loudon, Marlboro.
Purple: Columbian.

CURRANTS.

Red: Red Dutch, Long Bunch Holland, Victoria.
White: White Grape.
Black: Lee's Prolific, Naples.

GOOSEBERRIES.

Downing.

PEARS.

On account of the prevalence of blight and winter killing, pears are not generally recommended for Wisconsin. Good crops are occasionally produced under favorable conditions, especially in the southeastern part of the state. The following list includes both early and late varieties. List prepared by W. J. Moyle.

Bartlett, Clapp Favorite, Early Bergamont, Flemish Beauty, Idaho, Kieffer, Lawson, Seckel, Sheldon, Vermont Beauty.

TREES AND SHRUBS RECOMMENDED.

EVERGREENS.

For screens and windbreaks—Norway Spruce, White Spruce, White Pine.

For hedges and screens for shearing—Norway Spruce, American Arbor Vitae, Red Cedar.

For lawns—Norway Spruce for backgrounds. For groups—American Arbor Vitae, Red Cedar, White Spruce, Colorado Blue Spruce.

For small lawns—Arbor Vitae, Savin Juniper, Mugho Pine.

DECIDUOUS TREES.

The more desirable ones are starred, and a further selection of five is indicated by double stars:

**American Elm, Box Elder, Black Cherry, Carolina Poplar, **Green Ash, *Hackberry, Honey Locust, Larch, **Linden, **Norway Maple, *Scarlet Maple, **Silver Maple, *Sugar Maple, Scarlet Oak, *White Oak, White Ash.

DECIDUOUS ORNAMENTAL TREES.

This class includes smaller deciduous trees of more value for ornament than for shade or defense.

Cut-leaved Weeping Birch, Tartarian Maple, Ginnala Maple, Kentucky Coffee Tree, Mountain Ash, Weeping Willow, Russian Mulberry.

LIST OF SHRUBS RECOMMENDED.*

Scientific Name.	Common Name.
<i>Berberis vulgaris</i>	Common Barberry
<i>Berberis vulgaris</i> var. <i>atropurpurea</i>	Purple-leaved Barberry
<i>Berberis Thunbergii</i>	Thunberg's Barberry
<i>Corylus maxima</i> var. <i>purpurea</i>	Purple Filbert
<i>Diervilla florida</i>	Weigela (rose)
<i>Diervilla candida</i>	Weigela (white)

*From Bulletin 108, Wisconsin Experiment Station, by F. Cranefield.

<i>Diervilla hybrida</i> var. <i>Desboisii</i>	Desbois's Weigela
<i>Eleagnus argentea</i>	Silver Berry
<i>Euonymus Europaeus</i>	Strawberry Tree
<i>Hibiscus Syriacus</i>	Althea
<i>Hippophae rhamnoides</i>	Sea Buckthorn
<i>Hydrangea paniculata</i> gr.	Garden Hydrangea
<i>Lonicera Ruprechtiana</i>	Ruprecht's Honeysuckle
<i>Lonicera Tartarica</i>	Tartarian Honeysuckle
<i>Ligustrum Amurense</i>	Amur Privet
<i>Morus Alba</i> var.	Tea's Weeping Mulberry
<i>Philadelphus coronarius</i>	Mock Orange
<i>Philadelphus coronarius</i> var. <i>aurea</i>	Golden Mock Orange
<i>Philadelphus inodorus</i>	Mock Orange, large fl.
<i>Potentilla fruticosa</i>	Shrubby Cinque Foil
<i>Prunus nana</i>	Russian Almond
<i>Rhodotypos kerrioides</i>	Rhodotypos
<i>Rhus Cotinus</i>	Smoke Bush
<i>Ribes aureum</i>	Missouri Flowering Currant
<i>Robinia hispida</i>	Rose Acacia
<i>Rosa rugosa</i>	Japanese Rose
<i>Sambucus nigra</i> var. <i>aurea</i>	Golden Elder
<i>Spiraea Bumalda</i>	Bumalda Spiraea
<i>Spiraea Bumalda</i> var.	Anthony Waterer Spiraea
<i>Spiraea Billardii</i>	Billard's Spiraea
<i>Spiraea Douglasi</i>	Douglas' Spiraea
<i>Spiraea Japonica</i>	Japanese Spiraea
<i>Spiraea salicifolia</i>	Meadow Sweet Spiraea
<i>Spiraea Van Houtte</i>	Van Houten's Spiraea
<i>Syringa Persica</i>	Persian Lilac
<i>Syringa villosa</i>	Chinese Lilac
<i>Syringa vulgaris</i>	Common Lilac
<i>Tamarix Pallasii</i> Desv. (<i>Tamarix Amurense</i> Hort.)	Amur Tamarix
<i>Viburnum Opulus</i> vr. <i>sterile</i>	Snowball

ROSES.

Hardy garden—Harrison Yellow, Persian Yellow, Madame Plantier. Twelve varieties hybrid perpetual—Paul Neyron, Mrs. J. H. Laing, Gen. Jacqueminot, Dinsmore, Marshall P. Wilder, Coquettes des Blanches, Earl of Dufferin, Jules de Margottin, Vick's Caprice, Magna Charta, Prince Camille de Rohan, General Washington.

Moss roses—Perpetual White, Salet, Paul Fontine, Henry Martin.

Climbers—Prairie Queen, Russel's Cottage, Seven Sisters, Gem of the Prairies, Crimson Rambler.

COMPARATIVE HEIGHT AT MATURITY OF DIFFERENT SHRUBS.

The height at maturity of the different species must be considered when planting in groups or borders. This will depend so much upon their environment that it is difficult to give the height in feet that any species may be expected to attain. When different kinds are planted under like conditions it may be assumed that relative heights will be maintained. The following may serve as a partial guide in planting:

Tall—10 to 15 Feet.

Barberry (Common)	Lilac, Common
Barberry (Purple-leaved)	Lilac, Japanese
Golden Elder	Lilac, Jossika's
Honeysuckle, Fly	Mock Orange
Honeysuckle, Slender	Sea Buckthorn
Honeysuckle, Tartarian	Siberian pea tree (tall)
Honeysuckle, Tartarian white	

Medium—6 to 10 Feet.

Crandall Currant	Silver Berry
Honeysuckle, Blue	Strawberry Tree
Japanese Rose	Spriaea, Billiards
Lilac, Chinese	Spriaea, Douglas
Purple Filbert	Spriaea, Three-lobed
Rose Acacia	Spriaea, Van Houten's
Russian Almond	Weeping Mulberry
Siberian Pea tree (dwarf)	Wiegelas

Dwarf—2 to 6 Feet.

Althea	Spriaea, Anthony Waterer
Barberry, Thunberg's	Spriaea, Ash-leaved (Sorbaria)
Cinque Foil	Spriaea, Bumalda
Honeysuckle, Albert's	Spriaea, Japanese
Hydrangea	Spriaea, Meadow Sweet
Rhodotypos	Spriaea, Plum-leaved

A LIST OF NATIVE SHRUBS DESIRABLE FOR PLANTING ON HOME GROUNDS.

<i>Scientific Name.</i>	<i>Common Name.</i>
<i>Arctostaphylos Uva-ursi</i>	Bearberry
<i>Ceanothus Americanus</i>	New Jersey Tea
<i>Cephalanthus occidentalis</i>	Button Bush
<i>Cimaphila umbellata</i>	Prince's Pine

<i>Comptonia aspleniflora</i>	Round-leaved Dogwood
<i>Cornus stolonifera</i>	Red Osier Dogwood
<i>Dirca palustris</i>	Leatherwood (Wickopy)
<i>Epigaea repens</i>	Trailing Arbutus
<i>Euonymus atropurpureus</i>	Wahoo
<i>Hypericum pyramidatum</i>	St. John's Wort
<i>Ilex verticillata</i>	Winterberry (Holly)
<i>Juniperus procumbens</i>	Trailing Juniper
<i>Myrica Gale</i>	Sweet Gale
<i>Physocarpus opulifolia</i>	Ninebark
<i>Rhamnus catharticus</i>	Buckthorn
<i>Rhus typhina</i>	Staghorn Sumac
<i>Rhus glabra</i>	Smooth Sumac
<i>Rhus copallina</i>	Dwarf Sumac
<i>Ribes rubrum</i>	Wild Red Currant
<i>Ribes floridum</i>	Wild Black Currant
<i>Rosa lucida</i>	Wild Rose (tall)
<i>Rosa blanda</i>	Wild Rose (dwarf)
<i>Rubus odoratus</i>	Purple-flowered Raspberry
<i>Rubus Nutkanus</i>	White-flowered Raspberry
<i>Sambucus Canadensis</i>	Common Elder
<i>Sambucus pubens</i>	Scarlet Elder
<i>Shepherdia Canadensis</i>	Shepherdia
<i>Symporicarpus racemosus</i>	Snowberry
<i>Symporicarpus vulgaris</i>	Coral Berry
<i>Taxus baccata</i>	Ground Hemlock
<i>Viburnum lentago</i>	Sheepberry
<i>Viburnum dentatum</i>	Black Haw
<i>Viburnum acerifolium</i>	
<i>Viburnum opulus</i>	Bush Cranberry
<i>Zantoxylum Americanum</i>	Prickly Ash

BLACK LIST

A LIST OF SHRUBS ALL OF WHICH HAVE BEEN TESTED ON
THE GROUNDS OF THE EXPERIMENT STATION AT MADI-
SON AND FOUND UNSATISFACTORY.

<i>Scientific Name.</i>	<i>Common Name.</i>
<i>Azalea arborescens</i>	Rhododendron
<i>Azalea viscosa</i>	Rhododendron
<i>Azalea nudiflora</i>	Azalea
<i>Azalea mollis</i>	Azalea
<i>Calycanthus floridus</i>	Sweet-scented shrub
<i>Caryopteris Mastacanthus</i>	Blue Spiraea
<i>Chionanthus Virginica</i>	White Fringe
<i>Clethra alnifolia</i>	Sweet Pepperbrush
<i>Colutea arborescens</i>	Bladder Senna
<i>Cornus florida</i>	Flowering Dogwood
<i>Cydonia Japonica</i>	Japanese Quince
<i>Daphne Cneorum</i>	Daphne
<i>Daphne Mezereum</i>	Daphne
<i>Deutzia gracilis</i>	Slender Deutzia
<i>Eleagnus longipes</i>	Goumi
<i>Exochorda grandiflora</i>	Pearl Bush
<i>Forsythia suspensa</i>	Golden Bell
<i>Halesia tetrapeta</i>	Snowdrop tree
<i>Itea Virginica</i>	Virginian Willow
<i>Kerria Japonica</i>	Kerria
<i>Ligustrum vulgare</i>	Common privet
<i>Paulownia imperialis</i>	Paulownia
<i>Prunus cerasifera</i> var. (<i>Prunus pissardi</i> Hort.)	Purple-leaved Plum
<i>Prunus Japonica</i>	Flowering Almond
<i>Prunus triloba</i>	Flowering plum (double)
<i>Spiraea Arguta</i>	Arguta Spiraea
<i>Spiraea Thunbergii</i>	Thunberg's Spiraea

The plants of certain of the above named varieties made a good growth each year but have not blossomed unless given thorough winter

protection. In this class are Bladder Senna, Flowering Almond, Flowering Plum and Golden Bell.

The Japanese Quince is hardy of bush but has not borne flowers except when given winter protection. The Goumi will only bear fruit when protected in winter. The double-flowered Almond will blossom freely if given thorough winter protection, otherwise it will kill back severely. The double-flowered Plum grows well and after a mild winter will bear flowers in advance of the leaves; unreliable, however, four years out of five if unprotected.

The others of this list have either died outright or else barely survived.

BUSINESS CARDS OF MEMBERS.

Adams, W. H., Eagle River, small fruits.
Barnes, A. D., Waupaca, nursery and fruit farm.
Bingham, D. E., Sturgeon Bay, nursery and fruit farm.
Brown, A. D., Baraboo, I. X. L. nursery.
Chappel, F. H., Oregon, nursery.
Coe, Converse & Edwards Co., Ft. Atkinson, nursery.
Downing, M. B., Milton Nursery.
Fancher, W. E. Corliss, Nursery.
Ferguson, F. J., Wauwatosa, nursery.
Foley, M. F., Baraboo, nursery.
Hager, W. S., West Depere, small fruits.
Hanchett, Wm., Sparta, small fruits.
Hatch, A. L., Sturgeon Bay, nursery and fruit farm.
Herbst, J. L., Sparta, small fruits.
Johnson, Franklin, Baraboo, small fruits.
Jeffrey, Geo. J., Milwaukee, small fruits and orchard.
Kelley, A. N., Mineral Point, fruit farm.
Kellogg, L. G., Ripon, nursery and small fruit.
Kellogg, Geo. J. & Sons, Janesville, nursery and fruit farm.
Loope, T. E., Eureka, nursery and small fruit.
McKay Bros., Parderville, nursery.
Moyle, W. J., Union Grove, nursery.
Parsons, A. A., Omro, fruit farm.
Palmer, L. H., Baraboo, small fruits.
Pearson, C. L., Baraboo, small fruits.
Post, Lewis, Madison, small fruits.
Philips, A. J., West Salem, nursery and fruit farm.
Ray, Joseph, Madison, fruit farm.
Ramsey, Robt., Baraboo, fruit farm.
Reis, John, Ithaca, fruit farm.
Richardson, C. L., Chippewa Falls, small fruits.
Rentschler, F., Madison, greenhouse.
Rentschler, Geo., Madison, greenhouse and nursery.
Roe, J. W., Oshkosh, fruit farm.
Smith Bros., Green Bay, market garden and small fruits.

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Spry, John, Ft. Atkinson, small fruits.
Stark, Frank, Randolph, fruit farm.
Tamblyngson & Son, Ft. Atkinson, nursery.
Toole, Wm., Baraboo, pansy specialist.
Toole Bros., Baraboo, seed corn.
Underwood, J. M., Lake City, Minn., nursery.
Utter, Delbert, Caldwell, fruit and vegetables.
Wilkins, A. P., Delavan, nursery.
Williamson, W. D., Madison, tree protectors.
Williams, Norman G., Shiocton, nursery.

TRANSACTIONS

OF THE

Wisconsin State Horticultural Society

SUMMER MEETING.

Oshkosh, Wis., August 29th, 1905.

MORNING SESSION.

The meeting was called to order by the President, Dr. T. E. Loope, at 10:30 o'clock, in the City Hall.

After the invocation had been offered by Rev. W. F. Fox, the president introduced the mayor of Oshkosh, who delivered an address of welcome.

ADDRESS OF WELCOME.

HON. JOHN BANDEROB, Mayor of Oshkosh.

Mr. President, Ladies and Gentlemen of the Wisconsin Horticultural Society :

In behalf of the citizens of Oshkosh I extend to you our best and most cordial greetings and a hearty welcome to our city. The people of Oshkosh are especially pleased to have you hold your meeting in our city, and we shall try to make your visit with us both pleasant and profitable. If we can in any way assist you in your labors during your convention we want you

to consider ourselves at your service. I want to tender you my congratulations for the beautiful display of flowers and fruit you have made here, showing the products that can be produced in a garden and made possible only through your untiring efforts and continuous study, the result of which is a great benefit to your fellowmen and for which you deserve great credit.

At this time it may be fitting to turn back and speak about the first garden ever tilled by the human family. The first garden that we know of or read about in the Scriptures was in the western part of Asia, several thousand miles from this place, the birthplace of man and the cradle of civilization. According to Moses this garden was called the Garden of Eden. We read that the Creator had this garden prepared with a great deal of care for Adam and Eve, and to realize the condition of the garden at that time and contrast it with gardens at the present time; to see how the first human beings were started in gardening and note the developments that have been made, is what I would like to impress upon your minds. Adam and Eve, it seems, got married and the garden was turned over to them as a wedding gift. We find no record of a wedding trip, at least they did not do as they do nowadays, but we take it for granted that they were fond of each other and were prepared to start housekeeping at once and till their garden. According to Moses Adam and Eve were very happy people, and they were contented and economical in their mode of living. Eve would not even buy goods enough to make an apron and Adam was about in the same condition. It seems economy was their strong forte at that time, but things have changed a great deal since that time. For myself I like to see a woman who is economical, but I think Eve carried economy to the extreme in doing without material for garments for both of them until the leaves began to grow. Both Adam and Eve took charge of the garden and were told to make use of the fruit that grew there, with the exception of the apples that grew on one particular tree. This tree was not to be molested, the apples were not to be eaten, and if they did so dire punishment would be meted out to them. It appears that the apples on this forbidden tree were the most luscious and tempting in the whole garden, and Eve soon found this out and induced Adam to pick and eat some of this forbidden fruit. Adam yielded to Eve's solicitation and they both ate of the fruit with the result that they were driven out of the garden. I be-

lieve if we had been there we would have followed Eve's advice, for it is in the nature of things that the ladies know better the taste of good things than do the men.

This, my friends, was the first attempt at horticulture, and at the same time the first act of wrong doing of which we have any knowledge, and this occurred about six thousand years ago. That forbidden fruit must have been luscious to the taste and beautiful to look at. Since that time great improvements have been made in the art and science of horticulture.

We hope your meeting here will be a benefit to your society, and when you have concluded your labors and return to your homes our best wishes will go with you. We trust your stay in Oshkosh will always be a pleasant memory. I thank you.

RESPONSE.

PRESIDENT T. E. LOOPE.

I find nothing on the program to indicate that the President of the Society has any right to make a response to the address of welcome, and I am very glad of that for the sake of the President. I wish to say, however, that we are under deep obligations to our friend, the mayor, for his many compliments. We always take such compliments very naturally and believe we are entitled to a great many more than we get. There is nothing small about us in that respect. There is only one thing that the mayor said to which I would object. He did not tell us how wise we were. He said we had perseverance and all that, but he did not dilate upon our knowledge, and I want to tell you that out wisdom is beyond measure.

But I want to get back to that garden. In the Garden of Eden Adam and Eve did not have the codling moth, the curculio, the tent caterpillar, the monilia or any of the fungous troubles. They had nothing of that kind to contend with. We have all these things and a great many more, and the human race has some very hard things to fight against. Just think, you cannot take a breath without breathing into your system thousands and millions of bacteria at this moment. I often think it is a wonder

how we exist in that we have so much more to contend with than our ancestors, and I think we are entitled to a great deal of credit for living at all.

We are very glad to accept the gracious hospitality of the beautiful city of Oshkosh. We have with us this morning quite a noted man, one whom I have known for a good many years, when he was just a common man and a doctor in a country town, and he does not need much of an introduction from me. I have the pleasure of introducing to you Dr. W. A. Gordon, superintendent of the State Hospital.

HORTICULTURE.

DR. W. A. GORDON, Superintendent State Hospital.

Horticulture has the most dignified history of any human occupation.

According to the sacred writings, the Lord God was the original horticulturist.

He planted the first garden and placed the man he had created in charge.

As men and nations have kept close to the soil, they have been successful and happy.

The accumulation of men in great cities is responsible for the greater part of the sorrow and suffering in the world.

Sin, disease and pain are largely the products of cities.

The decay of nationalities begins in the cities.

The rush of modern peoples to the great centers of population is the sure prognostic of degeneration and extinction.

A great city is more terrible than the desert.

New York is an unopened abscess, San Francisco is a carbuncle, Chicago is a vast cancer, Philadelphia is a corroding ulcer.

These pathological spots on our nation must be cleansed, disinfected, in fact, destroyed, unless the life blood of the entire republic is to be poisoned.

The crowding of people in cities is a national suicidal delusion, a sociological insanity.

The noises, smoke and polluted waters, the child labor, sweat shops and dance halls, the pornographic press, gambling hells and tenement houses, degrade, debauch or damn all classes of society.

City life is utterly abnormal.

Nature never intended men to dwell amid the mephitic surroundings inseparable from city life.

One of the leading functions of all horticultural associations should be the sending of missionaries to bring families from the city hell to the country heaven.

“Back to the garden” should be the shibboleth not only of horticulturists but of all patriotic citizens.

If the churches would consecrate the treasure they are using for the christianization of the Orient for the gardenization of America, they would do a thousand time the good and immeasurably advance the cause of that righteousness which exalteth a nation.

Every family on earth should have a garden.

Every human being should know something of the sweetness and beauty of the world.

If Oshkosh were spread out over Winnebago county, if Milwaukee were spread out all over the state, how much better it would be for all the people of Wisconsin.

China, the greatest agricultural nation, has outlived numberless kingdoms, principalities and powers that based their civilization on the decaying life of cities.

The government of France and the parliament of England are greatly exercised over the inferiority of the people of Paris and London, so manifest has become the degeneracy of the dwellers in these proud capitals.

It is absolutely certain that the day is not remote when they will be “one with Nineveh and Tyre.”

Our own great cities are on the same road.

City tenement houses and flats are the strongholds of sterility, divorce, polyandry and polygamy.

A ten story building is an assault on the rights of man.

Thieves, loafers, beggars, tramps, confidence men, highwaymen and bunco games are some of the flowers of city civilization.

His life is artificial, benumbing, trivial and commonplace.

Health foods made from refuse barley, and wheat that is too poor for flour; pure Vermont maple syrup; butterine; aniline

flavoring extracts; embalmed beef and adulterated medicines are among the fruits of city industry.

The potato bugs, chinch bugs and curculio caterpillars of the country are sources of wealth compared to the human drones, pests and parasites that abide in metropolitan palaces and hovels.

The amusing snobbery, the phenomenal conceit and the monumental impertinence with which city ignoramuses mention the dwellers in the rural districts, is an index of the blighting, narrowing influences of city surroundings.

The fortunate man who dwells in contact with our great, sweet, serene mother earth is scorned by the urbanite and called a yokel, a hayseed and a rube. He is looked upon contemptuously and treated superciliously.

A city dude, stained by cigarettes, sodden from French cordials, enervated by Parisian vices, clothed in London garments and speaking an English dialect, flouting a virile and virtuous American farmer, is a sight to make a patriot weep.

As well might a lowly tumble bug, plying his vocation on the highway, scorn the prancing stallion whose neck is clothed with thunder, who paweth in the valley and mocketh at fear.

The pallid and poisoned human product of cities can't tell parsnip from pigweed; he can't milk a cow, harness a horse or set a hen; he is ignorant, weak and helpless in the presence of nature.

His life is artificial, benumbing, trivial and commonplace.

The other day a chemist analyzed a lemon pie made in a large Chicago bakery. It was made of starch, saccharine and coal tar flavoring extract. It contained neither sugar, eggs or lemon.

A man who is fool enough to feed on wilted vegetables, cold storage fish and eggs, stock yards sausage and Chicago pie, hasn't brains enough to vote right and is incapable of self government, hence, all cities are ruled by bosses and plundered by grafters.

The city is a horrible organization for the enslaving, dwarfing and extermination of humanity.

The human wolves, sharks, rats and cats that are so plentiful in all large cities, were bright eyed, innocent, eager, hopeful boys and girls when they left the farm for the slime.

"Rescue the perishing" must be our motto.

The wretches, who live in tunnels and basements, under the sidewalks, who are caged in elevators and buried in lightless of-

fices, who live and die in abominable boarding houses, need the truth and the light more than the happy heathen who are picking wild grapes and swimming in the sundown summer seas.

The foundation of freedom is the home.

A house without children, a grandmother, a bible and a garden is not a complete home.

There are but few homes in cities.

The electric railroads have made it possible to have our cities torn down and the poor deluded inhabitants brought to the orchards, meadows and gardens.

All factories should be in the country, where every family could have two or three acres and keep a cow and have fruit, flowers and fragrance for the children.

A nation without homes, respectable and lovable, cannot long endure.

The city is the destroyer of homes.

The city men are only half developed; they are the most imperfect specimens known to science.

They prevent the progress of the race; they are a barrier against perfection.

The work of the horticulturist is the cleanest, healthiest and sweetest in the world.

A gardener, who raises one bushel of carrots, is of greater value to the state than all the brokers now on earth.

The parents should train the children to respect, to honor agriculture as one of the very few perfectly rational pursuits.

The reason that the young people are so eager to leave the beautiful and wholesome fields for the vile and ugly town is because they have not been properly treated at home.

Father has too much land and mother too much work to make the home attractive.

A piano, books, a bath tub and a few modern conveniences and personal devotion to the little ones would keep them at home.

The farms of Wisconsin average over a hundred acres.

A farmer doesn't need a hundred acres any more than he needs a harem.

Twenty acres of good land is too much for any man to cultivate thoroughly.

A beautiful home is the most beneficent institution on this earth.

Every man who has ten good acres and one good woman to love him and a few children to look upon him affectionately possesses all that is required to make a paradise in Wisconsin.

The reason paradises are not more frequent is because the fathers do not know enough to fashion them from the materials ready at their hands.

The fool who brow beats his wife and bullies the young ones won't have any paradise.

The imbecile who values booze or dollars or his own way in everything more than the respect of his wife and the affection of his offspring will not inhabit the bowers of bliss.

Neither religions, philosophies, arts, sciences, literatures, wealth, honor, power or fame will lead a man into the earthly paradise.

Our nature is such that love of a woman and the affection of children is necessary to make a man truly blessed, to make his life complete, to take him to the ultimate goal of life triumphantly.

The man with the hoe and ten acres can have this felicity if he works for it, if he is entitled to it.

The first duty of the horticulturist with ten acres and the hoe is to cultivate himself to a reasonable degree; he must keep his hair cut and use the bath tub whenever he has a chance and not use improper language when meals are not ready on time.

He must never forget those supremely wise words, "Man shall not live by bread alone."

He must let that other scriptural aphorism, "A man's life consisteth not in the abundance of the things which he possessth" control his career.

The wise horticulturist knows that the boys and girls are the greatest crop that can be raised on any soil in any climate.

During the winter evenings, there must be poetry and other inspiring literature for the children.

The boys should swim the Hellespont or cross the Delaware or defend Thermopylae or capture Vicksburg.

The cultivation of enthusiasm for great books cannot be neglected without irreparable injury to the family.

The elevating examples of men of genius must exalt the intellectual tone of the home.

Luther Burbank is probably the greatest and most useful man now living on this globe.

The story of his life should be familiar to every horticultural family.

If the home is not fertilized by the great wise books, it will be a barren place.

Paradise must have many flowers: roses, morning glories, holly-hocks, carnations and sun flowers are absolutely essential, and there must also be a honeysuckle by the bedroom window.

There must be an ice house and apple trees and bees, cherry trees and chickens, clover, two cows, strawberries, raspberries, spear mint for the roast lamb, basswood trees for their fragrance, crab apple trees for their exquisite perfume, a turkey gobbler for his strut, summer savory, dill, sage and horse radish for the kitchen, and thrushes in the orchard and meadow larks back of the barn.

There will be moon light and star light and the fructifying sunshine and gentle dew and sweet rain upon the tender leaves.

There will be the glory of the clouds, the enchanted air and the rapture of the sky.

The family will "help Hyperion to his horse" and sleep in Elysium.

Golden summers and mellow autumns will bring the rewards earned by honest, intelligent labor.

"Let not ambition mock their useful toil."

Pleasure, peace and plenty are on the ten acres.

Bosses, strikes and lockouts do not molest or walking delegates make afraid.

The ten acre farm is the only spot under the stars and stripes where there is absolute liberty and perfect independence.

THE ASTER.

MRS. D. D. HOWLETT, Oshkosh.

The aster is called the "Old Maid's Flower." I know no reason for this unless it may be its precision; being very exact in its outline of leaf, branch and flower. If it is the old maid's flower, it certainly partakes of the nature of the stately, modern old maid, whose health and strength attract a far greater

number of admirers than the less durable qualities of her delicate and dependent sisters.

The botanical name of the aster is, *calistophus*; from the Greek, meaning "a crown." But the aster has many meanings; it means astral or starlike. It has an unspoken language, all its own, and tells us of beauty and cheer. It has also its significance in the language of flowers. This language originated in the Orient and was carried to western Europe by Lady Montague. It was during the reign of Charles XII that the English speaking people learned the art of letter writing with blossoms. A flower placed in an upright position expresses a particular sentiment. If the flower is reversed it has the contrary meaning. The aster signifies "variety"; hence the Old Maid's flower means—I love variety—the spice of life.

I think I can trace the advent of the aster in the town of Algoma.

About fifty-five years ago a family came to this locality from Ohio, bringing with them the seed of what they called "Fall Roses", but which were later known as China asters.

These flowers, as I remember them, some ten years later, sprang up in the grass where they had been planted presenting single or semi-double crowns of purple and of crimson.

The aster, like all improved plants, and also animals, when illly cared for or left to shift for themselves, will degenerate or "run out," as it is termed, and eventually return to the type from which it originated.

A wonderful improvement has been made in the aster in even this short space of time. The flower as first brought from China about one hundred and seventy-five years ago was single like a daisy and now we have aster blooms so double and fluffy as to closely resemble the finest chrysanthemums in appearance. It may be that some Miller, Velmorin or Luther Burbank may overcome the aster's one disadvantage, that of odor, or rather lack of it, and we shall have a better aster than our "peony-flowered perfection." Mr. Burbank was once accosted as "the man who improves upon nature," and he replied, "No, sir. I only direct some of her forces."

In speaking of the aster it is generally conceded to mean the showy annual so universally admired; yet there are several varieties of perennial which are entirely hardy in this locality. Among them are *Nova Angiae*, the New England aster, of two varieties, blue and purple, and a white.

The asters now commonly cultivated are the descendants of a class of flowers brought from China in 1731, by a Jesuit missionary. Philip Miller, a famous English botanist, had as early as 1753 produced double asters. But the greatest improvement has been made since then, in France and Germany, where the best seeds are said to be produced. From the three countries, England, France and Germany, the aster has received a name—Queen Marguerite—French aster—German aster. America alone was willing to call it China aster in respect to its native land.

The aster has, at present, many distinct types, and as tastes differ I see no better mode of satisfying one's self in regard to varieties, than by growing them. Anyone may, by consulting any first class descriptive catalog, select varieties to suit his needs as to earliness, size of plant or flower and type better than I can tell; though the selection of varieties is an important factor in success or failure for any particular purpose.

In growing the young plants a sunny window is much better than a hot bed, as with the bottom heat and conditions of the latter, the young plants are liable to damp off. My method is to sow the seed in a shallow box, some six inches in depth, filling with good mellow earth to one and one-half inches from top. Saturate the earth and allow to drain off. Sow the seeds in rows about two inches apart, not too thickly, and cover with earth about one-fourth inch deep. The young plants will appear in from eight to twelve days. They should remain in the rows until the second or third leaves appear and should then be taken out and placed in other similar boxes, two inches apart in the rows; or if the season is sufficiently advanced they may be set in an especially prepared bed out of doors to remain until they are two or three inches high, when they should be transplanted to the garden rows in which they are to bloom. Transplanted in this manner they make much stronger plants than when sown in the open ground where they are to bloom.

At the time of sowing the seed, cover the top of the box with glass and set in a sunny window. The temperature should not go below 55 degrees at night nor above 75 degrees in the day-time. Water carefully and only when no water collects on the under side of the glass. If heavy drops of water form, the soil is too wet and the glass should be removed for a time. While the seeds are germinating the soil should never be allowed to become absolutely dry. If the plants remain in the

seed box until the leaves touch the glass, raise the glass by means of blocks across the corners of the box. Stir the soil between the rows as soon as you can see them, using a table fork or similar utensil.

As it takes from four to six months to bring the aster to perfection, it is necessary to sow the seed in February or early in March to insure blossoms before danger of frost. The earlier varieties may be sown in the open ground about the time the first trees come into leaf. If the seedlings are grown properly they will stand nearly as much frost as lettuce or cabbage.

The garden bed should be well enriched with well rotted barn-yard manure before plowing. Make a trench for the young plants and fill it with pulverized earth, sprinkled with unleached hardwood ashes, to the depth from four to six inches. Plants should either be set in a moist time or watered carefully upon setting. To prevent withering plants should retain earth upon the roots when reset; otherwise it takes much time and strength from the plants to recover from the shock. Plants should be set in garden bed from eight to eighteen inches apart according to variety; they should be kept entirely free from weeds and the soil should be stirred after each rain as soon as dry enough.

When the plants are from four to eight inches high a dressing of fine manure and wood ashes may again be applied. This should be well hoed in as the top dressing acts as a mulch and prevents drying out. The ashes serve as a fertilizer and make the earth too strong in alkali for some of the insect pests.

Many recommend potash and commercial fertilizers, but I have used nothing except the common materials to be found about any farm. Fresh manure should not be used as it will cause the plants to look sickly and scorched. Liquid fertilizer, not strong, may be used frequently with beneficial results, but one must use care in not allowing it to touch the foliage.

In order to raise the largest flowers, it is necessary to remove many of the branches, leaving only a few on each plant; and all but the terminal bud on each of these should be removed. I have a number of plants carrying but the main stalk and the blooms of these are enormous. The aster is much like the chrysanthemum in the care that it requires, also in its gross feeding qualities. It will survive with little care but requires careful culture to thrive. The conditions of culture are so numerous that one must speak in a general way and say, give the

plants intelligent care. They are easier to understand than humans because they quickly show their likes and dislikes.

Nearly all cultural directions agree that one should have a rich, loamy, friable soil for aster culture; and when I tell you that the soil on which I raise my asters is a red, heavy clay, which if not tilled just at the proper time, assumes a resistance scarcely less than adamant, you will probably feel that my asters are a failure; but I have plants three feet high and blooms six inches in diameter and I have told you how I obtained them.

I have had little trouble with the pests; but there are a few however, namely: the black beetle, black and green lice, green worm (similar to cabbage worm) and worm in roots. Blight will not bother with proper soil preparation and cultivation. The best method of destroying black beetles is to brush them into a pan of hot water or a small amount of kerosene. Sprinkle with paris green for worms and spray with tobacco water or kerosene emulsion for lice.

Now in writing this essay on asters I have been conscious that you received a much better one on the same subject at your winter meeting. I am a farmer's wife and have a limited amount of time and means to expend upon flower culture; but, like the old farmer at the convention:

“I thot I'd come an' give ye
Any pointers thet I could;
T' let the greatest number
Hev the most amount o' good.”

A FEW INSECTS INJURIOUS TO SHADE TREES.

C. E. BUES, State Nursery Inspector.

The commercial value of an ornamental or shade tree does not simply consist in the number of feet of lumber, or in the number of cords of firewood which it contains. Only a very short time ago did an American court render a verdict directing a telephone company to pay damages for a disfigured tree, on the basis of the *sentimental* value attached to it by its owner.

What prompts us to plant shade trees? Surely we have inherited the love for shade from a certain line of tailed ancestors, who are notorious for their love of tree tops. But if you look over the development of a Wisconsin farm, you will find in most cases that first, all trees were cut when the land was cleared by the settler, later, when he had time to enjoy the fruit of his labors, he planted again, around the house for *aesthetic reasons*.

Now, the value of any commodity is determined by the degree of our desire for it. Everybody knows that the desire for life in a certain town increases with the increase in the beauty of that town, called forth by more green trees along the streets and in the public places. *Therefore, beautiful shade trees are a commercial asset of that town.*

The closeness of planting of the same varieties of trees increases the liability of diseases and insect pests being carried from tree to tree. The fact that somebody else owns the trees next to yours renders it difficult for you to keep your trees clean, if your neighbor does not keep his clean. You should not be made to suffer for this. In paying taxes to run the town or city administration, you acquire the right to demand the protection of the town or city. While it is not such a serious matter to spray a few small shade trees to spray trees from thirty to seventy-five feet high requires power pumps. It requires a rather expensive outfit.

To do successful work in combating shade tree pests, except on isolated trees, co-operation is an absolute necessity.

In talking about *insects* injurious to shade trees, I would use a few of the worst pests of this state to illustrate the two kinds of poison used. *Sucking insects can not be killed by feeding them Paris green*, for they do not eat the surface of the leaf.

If you have any kind of an insect injuring your trees, or other crops, first you must find out does it chew, does it eat holes into the leaves. If that is the case, you can in most cases kill that insect by spraying its food plant with an arsenical poison. All caterpillars are of this kind. Just give them the cold mitten by holding out a glad hand in an extra carefully prepared breakfast.

If the insects do not chew holes into the leaves, but suck the sap of the tree, either at the leaves and juicy stems, as the plant lice do, or at the woody branches, as many of the scale insects

do, then you must kill them by a *contact* poison. Such poisons are either caustics, like tobacco or potash, which burn through the skin; or they are *greasy* or finely divided materials, which choke up the breathing pores on the sides of the insects. Remember these poisons are *contact poisons*, and they will kill no insect which they do not strike when thrown into the tree.

As an insect passes through several stages in its life cycle, in which it lives often under very different conditions, and has a very different appearance, it is necessary for us to follow it through its metamorphosis of egg, larva, pupa, and adult, to find a weak point where we may attack it.

Now we are going to take up our first insect, one that has probably done more injury to shade trees of late years than any other one, and which comes under our group of *sucking* insects.

THE COTTONY MAPLE SCALE. (*Pulvinaria Innumerabilis Rathv.*)

Nearly all of you are familiar with this noxious louse which is destroying the shade trees of southeastern Wisconsin.

From June 1st on it becomes conspicuous by the white, waxy, cottonlike egg nests, which protrude from the hind part of the brown scale, the hibernating female. Within this cottony nest are laid from 500 to 2,000 eggs, hatching from about June 20th to August 1st, according to season. The young lice crawl like a yellowish powder spread over the tree and settle down on the leaves, preferring the underside along the leaf ribs, but by their number often compelled to go to the upper surface. They insert their sucking beak into the leaf and commence to draw upon the sap of the tree, secreting a scale above their backs. After molting, the males and females differentiate; finally in August the winged males emerge. They mate with the females, which stay under their scales. Then the males die. Shortly before the leaves fall, the females move camp and travel back to the twigs, where they stay over winter. They are now about 1-16th inch long and brown in color. When sap flow starts in the tree, the insects commence to feed and grow like mushrooms after a warm rain. They draw the sap so fast that a great quantity secreted as honey dew drops on the sidewalks, making them dangerous for the traveler, especially after a rain. Now the cottony mass is secreted again and the egg-laying period begins again.

It has been maintained that epidemics of the cottony maple scale last only a few years and that their natural parasites hold them in check. It is true they have many enemies among insects, especially the lady beetles, *Aphis licus*, and some little Chalcid flies, and probably not more than one per cent matures in some seasons, but on the other hand one per cent may mean a twenty-fold increase yet.

If we have epidemics like we had this year and last year in southeastern Wisconsin, our trees are in danger and we must act. Soft maples, box elder, basswood, black locusts, are worst infested. A great many other trees and shrubs are less congenial to the insect.

There are several remedies to use, some of which are more complicated and less economical than others; but we have a remedy for nearly every season of the year.

THE COLD WATER CURE.

Just when the old brown scale commences to secrete the white egg-nest, the hind part of the body begins to raise and soon the insect is attached only by this waxy mass and its beak. If then a forceful stream of water is used with full hydrant pressure behind it, they can successfully be washed off before the eggs hatch. This is the most economical treatment when conducted by municipalities who have control of the hydrants. The expense is about 20 cents per tree. *But it is only successful before the young begin to hatch.*

WINTER TREATMENT.

When the trees are dormant, a spray of about 40 per cent kerosene and water, either in the form of an emulsion, or through a kero-water pump, should be used. Material saving nozzles, like the Vermorel, can be used for this work. It is well to prune the dead wood out before spraying.

“HEADING IN.”

When trees are weakened, cut the tops back and then spray the dormant tree with 40 per cent kerosene. They will make a nice top again.

25% KEROSENE.

Shortly before the leaves fall, and before the lice have left the leaves, these can be sprayed with 25% kerosene and burnt by

this spray. They will thus drop prematurely and carry a great many insects down with them.

MIDSUMMER SPRAYING.

After the eggs have hatched and the young have gone on the leaves, we can use a spray of from 7-10% kerosene emulsion, according to the vigor of the tree. This will kill the youngest insects that are hit, but it is very difficult to do thorough work.

Another insect to merit our attention and representing the chewing type of insects is the

WHITE MARKED TUSSOCK MOTH.

This has been rather conspicuous in recent years, especially in Milwaukee, but may be found in many towns and cities in the state.

The stage of this insect which is sufficiently striking to attract the attention of the public are the whitish eggmasses, which are plastered on top of a dirty grayish cocoon, all over the trunks of shade trees in the fall and winter. Elms are specially in favor with this pest, but the caterpillars feed on a great variety of trees.

The life history of this insect is illustrative of that of several moths. It is very similar to that of the dreaded cankerworm of the East, which defoliated thousands of acres of apple orchards in western New York about ten years ago, and brought about a status, where an apple orchard was considered a detriment to a farm and its possession was considered a sufficient reason to ask for a reduction of taxes.

The caterpillars which feed on the foliage are remarkably beautiful, with their pretty red heads, two tufts of hair protruding, clearly and sharply cut, forward like a mustache à la German emperor. A large black tuft of hair extends backward and short white brushes of the same nature cover the yellow striped body. They look like a "jim dandy" coming fresh out of a barber shop. They remind me, with that bright fur and black brush elevated, of a beautiful fourfooted animal, which one encounters sometimes on the roadside on moonlight nights. It looks so cheerful,—but oh! the sad consequences!

The consequences are sad here, for the larvae are voracious feeders. They strip a tree right down. They spin their dirty

white cocoons out of hair and silk in protected places among the bark or on the fences. From these emerge the adult moths. The males are winged and capable to pass from tree to tree, they are of a grayish color, about $\frac{3}{4}$ inch long, the caterpillar being a little more than an inch. The females have no wings and lay the white eggmasses right on top of the cocoon from which they emerge. From these hatch the little caterpillars again. I think we have only one brood in this state.

While this insect is very injurious, it is a comparatively easy one to deal with. The fact that the female has no wings enables us to prevent from laying eggs in the tree by putting a fluffy cotton band around the trunk. However we must first clean the tree of those insects that are there already. This can be done during the winter by picking off the egg masses or by spraying with $\frac{1}{4}$ of Paris green to the fifty gallon barrel of water, while the caterpillars are feeding.

It is well to consider here a newcomer among Wisconsin insects, so that we can be on the lookout. I have observed a slight touch of its work in the southern part of the state.

THE IMPORTED ELM LEAF BEETLE.

This beetle is a close relative of the potato beetle, the asparagus beetle, the striped cucumber beetle, and similar insects which occupy a very prominent place in the Rogues' Gallery of insect criminals.

It looks very much like the striped cucumber beetle. It is about $\frac{1}{4}$ inch long. The orange colored eggs are deposited in clusters from 5 to 25 on the underside of the leaf. The larvae is yellowish to brown, with many dark colored hairs.

The beetles feed on the young leaves in the spring, eating holes into them. The larvae feed mostly on the underside of the leaves, chewing off the tender underside and leaving the hard veins.

The insects seem to manifest in some sections a preference for one kind of elm to the other. In some sections the American elm suffers the more, in some the English.

REMEDIES.

Spraying with arsenate of lead has proved to be the most successful remedy for poisoning the foliage. This insecticide

sticks better than Paris green. There should be one spraying to catch the beetles when the leaves are developing, and at least one later on when the young larvae hatch. If the insect is noticed, apply to the Experiment Station for definite instructions.

Most leaf eating pests can be handled by poison sprays after the pattern of the Tussock moth larvae. Of scale insects, few are here in Wisconsin injurious enough to be called serious pests on shade trees. Yet there are a few which may require treatment.

The Elmbark Louse (Chionaspis Americana) is very bad on some trees in Milwaukee and some towns in the southern part of the state.

The Oyster Shell Barklouse (Mytilaysis pomorum) injures frequently mountain ash, flowering crab, and other trees considerably.

The Scurfy Apple Scale infest apple trees and may be found on native thorns.

The San Jose Scale attacks a great number of shade trees and shrubs, if given a chance.

All of these are best treated during the dormant season by spraying with diluted kerosene, or with the lime and sulphur wash.

If you have any kind of scale on your trees, send them to the Experiment Station.

It would lead us too far to take up the subject of borers, but I want to say this: The expense of spraying large trees is not as considerable as is generally believed. The first outfit is expensive, but every up-to-date town or city should procure one. A 4-5 horse power gasoline or steam engine and pump, with hose, wagon and all incidentals, costs about \$500. The spraying of trees will run from 10 to 50 cents according to material, management and size of trees. Most citizens will gladly pay for it, if they have the assurance of good reliable work.

Co-operation is success in civic improvements.

DISCUSSION.

Mr. W. J. Moyle: What will we do with large trees that are badly infested and have become weakened?

Mr. Bues: If you have such trees that have become weakened I would cut them back severely and in addition to that I would spray them with kerosene emulsion. Do not do the cutting without spraying, it would only make them worse. If those trees were badly affected I would cut out the dead wood, the unnecessary wood, the wood that the tree did not need anyway, and then I would spray them during the winter with kerosene emulsion. Otherwise let them go until the first week in May, when the white masses begin to show, when the young commence to hatch, then spray them with water from a hydrant or from a fire plug which will give force.

Mr. Moyle: There is an insect we find on our cottonwood, weeping willows and Carolina poplar. We are planting trees but the insects are eating them right off.

Mr. Bues: It is the imported willow beetle, so-called, and is shipped to this state in nursery stock from New York and Ohio so far as I know. Every case where this insect has been found that has come under my observation I have traced to those two states. New York is badly infested because proper attention was not given the matter, but it should be barred out of this state. We should put it on the blacklist. You can't do anything with it except to dig it out with a knife. My habit has been to go through the nursery and if I find a tree more or less damaged I simply break it right off where the injury exists.

Mr. Geo. J. Kellogg: Does the tree ever recover? Thirty years ago at Janesville we had the cotton louse, but all the trees except a few recovered. What was said about a parasite?

Mr. Bues: Prof. Forbes of the Illinois Experiment Station, wrote a little pamphlet on "Insect Cycles," and he found upon investigation that this cotton maple scale has regular periods of from eight to ten years in which it makes visitations, and the period of visitation usually lasts three or four years, and then for four or five years there is a period of immunity. Just a word in regard to this parasite. The point in question is this, if this parasite breeds only on this particular plant it will soon cut off its own food supply on the plant and the parasite will

die out, and then it takes a number of years to bring it back again. The opinion has been that the parasite will kill out the scale in a few years, but that is not true. Upon that basis people who leave it to the parasite would have the condition that confronts us now. I think as I look at it that there is a certain relationship between the amount of precipitation and the appearance of this insect, because in wet seasons we have had more trouble.

Mr. Geo. J. Kellogg: If cities can spray with water why would it not answer in the country?

Mr. Bues: There were but few cases that came under my observation in the country where the trees were infested. If it was found in a small town which had no water pressure I would use the fire engine and hose. In the country the only thing to do is to spray with a regular spray of kerosene emulsion, and spray in the winter, and if the trees are too badly affected you have to cut them back and then spray. The trouble is mostly in the cities and larger towns, and you find it sometimes on the farms around the towns. Any community that will plant its maples close together will get it.

Mr. Geo. J. Kellogg: Why not cut out the soft maples and save the elms?

Mr. Bues: I honor that recommendation. I say let the maples die and plant more elms. We are all satisfied that the elm is better, but if you take a place where nearly all the trees are maples and you take them all out you will have a treeless town.

The President: I have noticed sometimes where there are two or three maples sometimes only one is infested.

Mr. Bues: That was just the beginning of the infestation. The young had hatched and were probably moving in the tree. If the trees are planted only fifteen or twenty feet apart there is nothing to hinder their progress.

Mr. Root: I found in Milwaukee on Fourteenth street and also on Grand avenue that the elms were infested by an insect which I should judge was very much similar to the cotton moth. Every tree was covered with a dark brown mass of cocoons, and I should think the body of the tree contained perhaps a hundred of those cocoons.

Mr. Bues: That was the second insect described, the white spotted tussock moth.

Mr. Root: Is that the insect working in Milwaukee?

Mr. Bues: Milwaukee is full of it. You should go to work and pick off those cocoons and then adopt the spraying process, but those two must go together.

AFTERNOON SESSION.

HARDY HERBACEOUS PERENNIALS.

JOHN TIPLADY, Lake Geneva.

My subject for today is the Hardy Herbaceous Perennials, a class of plants that are yearly gaining favor with the flower-loving American public.

Pardon me if I dwell occasionally on the paeonia, phlox, columbine, or any of the plants about which other gentlemen will address you later on, or advance any theory with reference to perennials of the wild.

The successful cultivator of the hardy perennial will first bear in mind that the soil must be well prepared by incorporating a liberal supply of manure making sure that the drainage is perfect.

If a veranda porch is first to be planted it must be planted with a perennial climber. Only in exceptional cases must we use an annual, which is such a bother to train on strings and finally tear down in the fall. If the location is permanent, then plant a permanent vine, that you may enjoy each year until the very height of its beauty has been realized. Who can imagine a more gratifying sight than a beautiful clematis in full bloom, stretching its flowery existence across your veranda, affording healthful shade to the owner. Several worthy clematis are now on the market. Montana grandiflora blooms in May, coccinea in June, Jackmanii in July, and paniculata in September. Jackmanii, the universal favorite, has not been superseded by any variety of that color and habit, improving in splendor as it advances in years, and like civilization, annually reaching out for newer fields to cover, and the same may be said of

paniculata, recognized as the choicest and most satisfactory climber up to date. When well grown it always pleases the most fastidious lover of nature.

Another good climber is the purple wisteria. In Central Park, New York, it is used almost exclusively for covering rustic arbors, and during May and early June they are a veritable mass of purple. The secret of success is in the pruning. Cut them back as you would a grape vine or a red-currant.

For covering a brick building use *ampelopsis Englemanii*, whose tendrils resemble the foot of a tree toad, clinging to the smoothest surface. *Ampelopsis quinquefolia* has to be supported by wire, or whilst loaded with moisture or struck by a gale it will sometimes get loose and fall to the ground a twisted mass of vegetation. *Veitchii* is not hardy and cannot be relied upon.

It is pleasing to look at a perennial garden and to notice the diversity of fragrance and color. There is no class of ornamental plants that can equal the hardy herbaceous perennial in popular favor nor in merit. Some of them continue to bloom for weeks or months while others are only on display for a short time but they make up for it by the beauty of the blossoms they produce.

Perennials can be secured in every gradation of size and color, and with a little care in selecting varieties a constant succession of bloom can be maintained through the entire summer.

People are beginning to realize that it is better to plant perennials which come up year after year, than to bother with annuals altogether. But do not think that I am relegating the annual into the backwoods of oblivion—not much. They have a duty to perform in every garden and we will always have our sweet peas, and asters in endless variety, marigolds and zinnias to keep grandmother's patch fresh in our minds—snapdragon, cornflowers, mignonette and cosmos. But we want to encourage the hardy herbaceous perennial. When there is an attempt to say which perennial is the best, there will probably be a dozen named by people as their favorites, and there would be reasonableness in the arguments in favor of each. For instance, the beautiful columbine, whose champions have organized a columbine society, the paeonia, whose champions have organized a paeonia society, some one would plead the golden rod, common but beautiful—our national flower—we would also hear from the

Funkia, hemerocallis, coreopsis delphinium, phlox, larkspur, Dahlia and gladiolus, many of which are indispensable, and in fact have a popularity that puts them in a class by themselves. The value of the perennial phlox for instance lies in its fragrance, diversity of color, and long blooming period. The iris, whose very name signifies "rainbow," has a wonderfully delicate range and combination of color. Both of these plants will be duly discussed at this meeting by gentlemen who have papers prepared on the subject.

The rose colored spikes of lythrum when seen growing to perfection, the tips of its rosy colored spikes reaching 6-7 feet high, blooming as it does through June, July and August, presents a very satisfactory appearance when planted among shrubbery in clumps or blended with the yellow flowers of heliopsis or hemerocallis, bordered with that persistent flowering perennial, Achillea roseum (the pink variety of Milfoil.) But keep the blue away from this combination or there will be discord. In planting for effect allow a clump of shrubbery or a building of some kind to break the view before planting your blue delphiniums, aconite, platycodons or for-get-me-nots. For yellow effect we have the different varieties of helianthus, heliopsis, heleniums and Rudbeckias, all tall growing plants, with hemerocallis or anthemis tinctora for a border. By this list you would naturally infer that all yellow perennials commence with H, but they don't.

For a pink and white effect in some desirable nook or corner, what is more pleasure than a group of herbaceous spirea with that stately variety aruncus with its tall pampas-like plumes for a background against the shrubbery—in front of this spirea Chinensis, a distinct and handsome species with its handsome white flowers, a little dwarfer in habit than the preceding one—bordered with that valuable little double variety filapendula fl. pl. with a clump located at one end and near the back of crimson meadow sweet, your combination is complete (pink and white).

If a red effect is desired at some distant point of view plant monarda didyma (known as bee balm—Oswego tea). Horse mint must be valuable, but this must be limited in size as the color is intense. Another plant worthy of cultivation is the Boltonia, a tall growing plant with pink and white aster-like blossoms produced in profusion during August and September.



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Another perennial strikes me as indispensable in table decorations, and that is the *gypsophilum paniculata*. Its breath-like blossoms when artistically arranged with other small flowers, gives a light airy effect so essential in the arrangement of center pieces or vases for the sitting room.

Another class of plants prized and admired by all is the *dianthus* or hardy garden pink, which give a profusion of sweet clove-scented flowers, beautiful in their simplicity and very easy to raise either from seed or cuttings taken during late summer. The *campanulas*, too, must not be forgotten. Ordinary good garden soil will suit these charming plants, easy to grow and useful for cutting. They are in size from 1 to 5 feet and the range of colors is white, pink, purple, blue and intermediate shades.

The following are dwarf, low growing kinds: *C. carpatica*, blue and white; *Garjanica*, blue and white eye, and *glomerata*, blue or mauve, 1 foot high.

The best of the fall varieties are *persicifolia*, *latifolia*, *macrantha*, *pyramidalis* and the double varieties *Moorheimi* and *Backhousii*. All perennial varieties are easily increased by division of the root but the biennials (*campanula media* or *canterbury bell*) must be raised each year from seed sown in June or July, pricked off into their permanent position and protected for winter. All *campanulas* are extremely beautiful, easy to grow, and should be in every garden. I must not close without saying a good word in favor of the *anemone* in its many varieties, *pulsatilla* and *Eliza Fellman* for early, with *Japonica* and its variety for late. *Whirlwind* and *queen Charlotte*—plant spring and fall.

If any one is interested in perennial growing and cannot afford, or does not care to procure the above named, he can satisfy his desire by collecting native species all of which bear a close resemblance to the cultivated kinds. By following up this kind of gardening and studying the needs of each particular species, he may in a few years become an expert and make a very creditable showing, comparing favorably with the cultivated article. He can collect and cultivate the *columbine Canadense*, and for *iris* grow the *wild blue flag* (*Iris versicolor* and *prismatica*). For *lilies* he may collect *lilium superbum* and *Canadense*, both native of Wisconsin. For a *campanula* he may collect the *harebell* (*campanula rotundifolia*), the blue bells of

Scotland, the flower famed in song and story. For a climber he can dig from the wild woods *ampelopsis quinquefolia* (the virginia creeper) and *clematis Virginiana*. His shrubbery may be composed of the different varieties of native dogwood (*cornus paniculata* and *stolonifera*), honeysuckle (*Lonicera Sullivanti*), wild gooseberry, witch hazel, prickly ash, flowering thorn and currant, with a ground cover of wild geranium, rue and strawberry.

For phlox he can use the moss pink, and if he cannot afford *Monarda didyma* he can collect *Monarda fistulosa*. For clumping among the shrubbery and for planting in distant nooks and corners he can collect a wild perennial of almost any height or color he may desire, from the tall growing Joe pye, that beautiful purple *eupatorium* which sometimes grows 10 feet high, away down in gradation until he strikes the *vinca*, *nepeta* and moneywort, but a few inches in height. Nature has bestowed on Wisconsin a wonderful range of native perennials.

In a tamarack swamp near Lake Geneva, that beautiful terrestrial orchid *cypripedium spectabile*, attains perfection par-excellence. Not a year passes but I visit that spot and pick an armful of these magnificent flowers. In the adjoining slough we often find the little *calipogon*, and later in the year the ground is tinted with the blue of the gentian—an intense blue—bluer than the bluest sky. Thus we have reviewed a few points of comparison between the cultivated and the wild.

DISCUSSION.

Mr. Cranefield: Would an amateur succeed in getting a good supply of herbaceous perennials from seed?

Mr. Tiplady: I have been very successful in the propagation of most perennials from seed. As a rule you cannot buy double flowered *campanula*; they do not produce seed, but they must be divided at the root in order to succeed.

Mrs. Sperbeck: I would like to know how to fix cold frames in this part of Wisconsin to winter pansies.

Mr. Tiplady: The pansy is a perennial. To get the best results with pansies, after buying the best seed you can procure, it should be sown in July or August, put in a cold frame and

protected in winter, then plant in a prominent position next spring. Pansies from spring sowing are not satisfactory, but to insure a profusion of beautiful flowers the seed should be sown in July or August and wintered over.

Mrs. Sperbeck: I have never had success with Canterbury bells, and I would like to know how they should be treated.

Mr. Tiplady: I give Canterbury bells the same treatment at about this time or September, except that Canterbury bells ought to be planted in a less prominent position. Remove them in the spring and plant where desired and you will have an abundance of flowers.

PHLOX.

F. H. DRAKE, Madison.

There is scarcely a flower garden of any pretensions that does not contain flowers from the four quarters of the globe. Our common garden and house plants are collected from the world at large. Flowers from Australia and the Indies blossom side by side with plants from Iceland and Siberia. Even in the hardy gardens of this north temperate zone, we have acclimated natives of southern Europe, Africa and the Orient. In the front rank of favorites with the roses and paeonies stands America's representative, the Phlox family. They combine three of the prime requisites of a hardy garden plant: hardness, profusion of bloom and neatness of foliage. The period of bloom of the three or four species most commonly cultivated extends from May until frost. Their ease of culture and vigorous growth, together with their freedom from insect enemies and disease, make them popular with every lover of flowers.

This genus was classified by Linnaeus, "the father of botany," probably in the latter part of the 18th century. He gave it the name of phlox from the Greek $\Phi\lambdao'\epsilon$ (flame), the ancient name of a brilliant variety of Lichnis, which he transferred to this distant American relative. One authority claims that the name was given on account of the shape of the flower bud and its fancied resemblance to a flame.

The variability of certain species has given rise to much con-

fusion of specific names by the writers and the trade of the last century. Thomas Nuttall listed 17 species in 1818, Don described 38 in 1838, while Professor L. H. Bailey, in the Horticultural Encyclopedia, says "about 30 species."

The Phlox family are all perennial herbs, with one important exception, the annual, *P. Drummondii*. There is one Chilean species; the rest are all North American, although the *P. Sibirica* is also found in Asiatic Russia.

THE HARDY PHLOX.

When we speak of "phlox," without using a common or specific name, we generally have in mind that group of tall hardy perennials, whose profusion of bloom is the glory of the late summer garden. This large horticultural group, comprising hundreds of varieties, stands in great need of a common or garden name. Its origin, though somewhat obscure, is traced to two or more species, so that any specific name is not available. One writer will refer to the whole group as *P. paniculata*, and another will call it *P. decussata*; recent writers have divided the group into two sections, the early or *suffruticosa* and the late or *decussata*.

The wild flower *P. paniculata* is a native of Pennsylvania and south, ranging west to Illinois. It is common in the woods, blooming in July and August; erect 2 to 4 feet tall. The flowers, borne in terminal panicles, are of a pinkish-purple, varying to white. This and in a lesser degree, the *P. maculata*, a plant of similar range and habit, are generally considered to be the parents of this group, which I will refer to hereafter as the "Hardy Phlox." To what extent other species have been used in the development of the cultivated varieties does not appear. The close relationship of the different species would seem to make crossing possible with many of them; it is even hinted that brilliant colors have been produced by crossing with the annual.

EARLY HISTORY OF CULTIVATION.

Although the hardy phlox is classed as an old-fashioned flower, it is of comparatively recent origin. Don's Gardener's Dictionary, published in 1838, asserts that *P. paniculata* was in cultivation in 1732 and *P. maculata* in 1740; but I can find no evidence that the development of the present garden varieties



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Perennial Phlox, in a Madison Garden.

was begun before the 19th century. A list published by Joseph Breck in the Horticulturist in 1847, enumerates about 20 varieties, including *P. paniculata* and *P. maculata* and others bearing the names of contemporaneous American and English gardeners. The colors described at that time covered nearly the same range as those now in cultivation; but they evidently were not generally planted in the gardens of this country, as the white and purple varieties were the only ones commonly cultivated in the gardens of a generation ago.

LATER IMPROVEMENTS IN THE CULTIVATED VARIETIES.

There have been great improvements in the hardy phlox in the last 50 or 60 years; the varieties now numbered by hundreds include the tall and the dwarf. The period of bloom has been lengthened from a few weeks in mid-summer to a period extending from June until frost. While the colors of many of the varieties cultivated today originated years ago, there has been a marked change in the increased size of the florets, and the size and shape of the trusses; differences in height and period of bloom have added to the number.

The phlox colors belong to the cyanic series, and from the pinkish-purple and white of the native flowers have been evolved a wonderful range of colors and combinations; from the white through many shades of pink to brilliant red, and from lilac and rosy mauve to dark crimson. The yellow and orange have been considered impossible in this series; a light buff and an orange red are the nearest approach to these colors yet obtained. Many of the handsomest varieties have a distinct "eye" in the center of crimson or carmine. There are some with petals delicately shaded with pink or rose, and a few with blotched or striped petals. Two varieties are offered with variegated foliage. The English gardeners were naturally the first to take up the development of this flower, and that it still occupies a prominent place in European horticulture is evidenced by the recent large importations, including a hundred or more varieties selected from the gardens of France, Germany, Holland and England. The recent growth of interest in floral and landscape gardening has created a demand for new and beautiful varieties, to which the trade has responded with long and carefully selected lists.

A FLOWER FOR THE AMATEUR GARDENER.

The amateur gardener of limited means, who invests in a few varieties of hardy phlox, will find that he has made an investment that will yield him most satisfactory dividends. He will have no hopeless war against insects and disease, and no complex problems of culture and propagation to distress him. Good nursery stock planted in the fall will produce handsome blossoms the following year. The second year will show a marked increase in the number of blossoming shoots, and in three or four years the original plant will have grown into a handsome clump which may remain undisturbed for years. If one has space to plant, he can increase the stock of his favorite varieties, beginning propagation the first season. In a very short time he will be able to plant in masses to his heart's content, or to the limits of his available space.

Do you

THE CULTURE OF HARDY PHLOX.

Phlox is perfectly hardy in this climate. Old clumps of the old fashioned purple and white, often seen around old homesteads, known to have been planted a half century ago, and having had little or no care in the last thirty years, have continued to bloom regularly every year. While hardy phlox belongs to the 'can't be killed" class of perennials, culture should not be neglected. It's ready response to good care and cultivation will amply repay any amount of trouble expended. Phlox should be planted in good rich soil, worked a foot or more deep. The roots do not extend more than six inches below the surface, but the deep preparation of the soil helps to retain the moisture which will rise by capillary attraction to within reach of the roots. In the fall, after the killing frosts, the tops should be cut and a light sprinkling of coal ashes applied to discourage slugs and other lurking insects. A light covering of manure or marsh hay is very beneficial, especially if the ground has been tilled and kept free from grass and weeds. The ground should be forked up in the spring, or better, manure forked in, and a mulch applied during the hot summer months. Water plentifully up to and during the blooming season. Old clumps should be taken up and divided every three or four years to prevent them from becoming root bound. Division and transplanting can be done in the early spring, though the best results are ob-

tained from fall planting. Plants should be set $2\frac{1}{2}$ or 3 feet apart each way, taking care that the taller and more vigorous growing plants do not overtop and shut out those of dwarfed habit. If our nurserymen would give more accurate descriptions of the habit of the different varieties it would make planting and planning easier for the average amateur.

Phlox is said to come into full floriferousness in the third or fourth year of its growth, when it becomes a large and vigorous clump with a hundred or more flowering stems. The largest clusters of flowers are, however, obtained on the younger plants. Many of the earlier blooming varieties will bloom again later in the season if they are cut down after the first period of bloom.

The hardy phloxes are especially valuable in landscape work, as they will thrive in the shade or the open and in any exposure. Planted in masses or in the borders, their brilliant pinks, carmines and crimsons round out the summer with a luxuriant display, and strike a harmonious chord with the prevailing yellow and gold of the autumn flowers.

A FLOWER EASILY PROPAGATED.

There are no deep secrets in the propagation of phlox. They are easily propagated by division or by cuttings, and in this way only are the different varieties perpetuated. Seedlings do not come true, having a strong tendency to vary and revert to the original type. While new varieties are produced from seed, the great majority of seedlings are apt to be inferior to the parent stock; even with the most careful artificial cross fertilization, there are many failures to record for every desirable variety produced. If the self-sown seedlings are allowed to grow up about the original plant, they will eventually crowd it out and the result will be a mass of undesirable colors; nondescript purples and eye offending magentas.

The natural growth of a clump of phlox is accomplished in two different ways. At the base of each upright stem, from one to several eyes or underground buds are produced during the summer. From these eyes spring the new shoots the following season, each shoot repeating the process in turn, until by crowding and lack of nourishment, the limit of the size of the clump is reached. Any or all of these shoots may be separated from the parent plant in the early autumn and transplanted,

cutting the stem down to six inches or a foot in height. It is not until the plant is several years old that offsets are produced. These are underground root-like stems which come to the surface with an upright leafy stem, send forth their own roots and eventually separate from the original plant. Nursery stock is generally grown from cuttings, as a greater number can be produced in this way and they are of a more uniform size and quality. There is also less danger of stray seedlings being taken by mistake for offsets. Cuttings are taken for this purpose in the early spring from the vigorous young shoots. They root readily in sand or sandy soil, requiring only moisture and partial protection from the sun. The amateur should have no trouble in making them grow in the ordinary garden soil. These "spring struck" plants will generally bloom the first season a week or so later than the older plants. Branches may be broken off from the lower part of the trusses in early summer and treated like cuttings. The leaves of all cuttings should be reduced about two thirds to prevent too rapid evaporation.

A FEW OF THE BEST VARIETIES.

The varieties offered by the trade are much too numerous to mention; the names of a few years ago do not appear in the lists of today; but lest we forget our popular favorites when we read the attractive catalogues of a few years hence, a few of the most valuable and distinctive varieties should be recorded.

Athis, salmon pink, with crimson eye; an old variety with small florets, but the brightest and best of the color. This is often described as the tallest of all the phloxes, growing five feet tall with good cultivation. It is a vigorous grower, with strong stems, increasing rapidly, late.

Puritan, tall white, late flowering. A vigorous growing variety with immense branching panicles. It is grown by florists here who consider it very valuable for cutting.

Miss Lingard (Described by J. W. Elliot), "This belongs to the earlier or suffruticosa section of the phloxes. Established plants bloom in June and are about done when the late phloxes begin to bloom. Spring propagated plants do not bloom before August or often much later. We often have great beds of them after the late phlox have disappeared. The flowers are white with a delicate pink eye, which soon disappears. The panicles

which makes it one of the best phloxes by the florists here (Pennsylvania). It is a very strong grower, far more late sorts and when planted per least three feet apart. The foliage three to four feet."

Its purple variety put on the market one time, is said to be a hybrid of the

and striking purple shade, varying a dark steely blue and again a rich crimson grower, about two to two and a

coppery red with extra large trusses; in garden, planted last fall, bore a which was twice covered with florets.

about one and a half to two feet tall. sort; white, delicately shaded to pink a vigorous, strong stemmed variety.

the old favorites of the many varieties. White with distinct eye of carmine of semi-dwarf habit.

of the darkest colored. The flowers regular globe shaped panicles. Tall, slow growth.

brightest reds yet produced. Some orange red or a near approach to scarlet, perhaps more accurate. There is a tinge in the center. The stems of this variety are of the late sorts, seldom growing more tall but the plant increases in diameter than tall growing sorts. It would no doubt put out the shoots in early spring. It is a clinging plant.

THE CREEPING PHLOX.

moss pink or ground pink of the old fashioned most distinct type of phlox, in appearance very like the other species. The leaves greatly reduced on the creeping stems, give the plant a mosslike

—H.



Audience at Summer Meeting, 1905.



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are one to two feet long, which makes it one of the best phloxes for cutting and it is grown by the florists here (Pennsylvania) for that purpose. The plant is a very strong grower, far more vigorous than any of the late sorts and when planted permanently should be set at least three feet apart. The foliage is large and glossy. Height three to four feet."

Arthur B. Starr, a bright purple variety put on the market this year, blooming at the same time, is said to be a hybrid of the *Miss Lingard*.

Le Mahdi, a very distinct and striking purple shade, varying with the light; sometimes a dark steely blue and again a rich glowing purple. A vigorous grower, about two to two and a half feet tall.

Ferdinand Cortez, a fine coppery red with extra large trusses; dwarf. A specimen in my garden, planted last fall, bore a truss nearly a foot across which was twice covered with florets.

Aquillon, a late bloomer, about one and a half to two feet tall. A distinct and attractive sort; white, delicately shaded to pink and carmine in center. A vigorous, strong stemmed variety.

Richard Wallace, one of the old favorites of the many varieties with colored eyes. White with distinct eye of carmine tinged with violet; early of semi-dwarf habit.

Splendens, crimson, one of the darkest colored. The flowers are rather small forming regular globe shaped panicles. Tall, strong stems, of rather slow growth.

*Coquelicot*¹, one of the brightest reds yet produced. Sometimes described as an orange red or a near approach to scarlet, but a vermillion red is perhaps more accurate. There is a tinge of purple showing in the center. The stems of this variety are more slender than others of the late sorts, seldom growing more than one and a half feet tall but the plant increases in diameter more rapidly than the tall growing sorts. It would no doubt be an advantage to thin out the shoots in early spring. It is very effective as a bedding plant.

THE CREEPING PHLOX.

P. subulata, the moss pink or ground pink of the old fashioned garden, is a most distinct type of phlox, in appearance very unlike any of the other species. The leaves greatly reduced and crowded on the creeping stems, give the plant a mosslike

look that gave rise to the common name. It is valuable from a horticultural point of view, and has been in cultivation since 1786. It is a native of New York, west and south, growing on dry rocky hill-sides and sandy banks; the short flower shoots ascending from creeping and tufted stems. The native flowers are pinkish-purple or rose color, varying to white, blooming in April and May. It is becoming very important in landscape work, as it colonizes very readily, increasing rapidly and forming a dense mat of neat evergreen foliage. The blossoms, borne in few flowered cymes, are so profuse as to completely conceal the foliage. There are many colors now offered by the trade; rose pink, white, light blue, purple and some with pink or white eyes, crimson blotches, etc. *P. subulata* is entirely hardy and will thrive in almost any soil, provided it does not have too much water.

OTHER SPECIES OF PERENNIAL PHLOX.

The following species are often classed with the creeping phloxes by the trade. The flowers are borne in terminal cymes; stems ascending from $\frac{1}{2}$ to 2 feet from a more or less decumbent base. *P. ovata* or *Carolina*, and *P. glaberrima*, are two very similar species, ranging from Virginia and the south, to Michigan and Wisconsin. *P. Carolina* is reported as comparatively rare in the central states, but more common in the mountains of the south. The native flowers are a pinkish-purple. *P. Carolina* is offered by a prominent Pennsylvania nursery as the brightest blue flower in the phlox family. It blooms in June and July.

P. amoena, is another species offered by the trade. It is a native of Virginia, Kentucky and the south. Flowers purple, pink or white, born profusely on stems 6 inches high.

The *P. pilosa*, Linn. (*P. aristata*, Michx.) probably has the widest range of any of this group. It is found in dry woods and prairies from British America to Florida and Texas and east to New Jersey. The flowers are numerous, varying through pink and purple to white. I do not find it offered by the trade although it is recorded as having been in cultivation in 1759.

P. reptans is a native of Pennsylvania and the southern states, west to Kentucky. It grows 4 to 8 inches high with showy reddish-purple flowers—in cultivation since 1800. It is found in

the mountains of Pennsylvania where it is exposed to a temperature of 30° below zero, and should be hardy in Wisconsin. A variety described as deep rose color is offered by the trade.

P. divaricata, Linn. (*P. Canadensis*, Sweet) is perhaps the best known of this group. It ranges from New York to Michigan and Wisconsin, and north to Canada. The flowers are borne on slender stems 10 to 18 inches high; blue or pinkish-blue, sweet-scented and showy. It often colors the fields and borders the railroad tracks with its attractive flowers in May and early June. It is fine for naturalizing and prefers a rich soil. It has been in cultivation since 1825. It is offered by the trade in a soft light blue, and a white variety, *P. divaricata Alba*, has recently been put upon the market. This species has generally been called the Wild Sweet William, although Gray gives this common name to the *P. maculata*.

P. stellaria is a comparatively new species found in Kentucky and southern Illinois. It has a pale blue or silver gray blossom, growing about 4 inches high. This is now being cultivated by some of the eastern nurseries.

This interesting group of phlox will, no doubt, assume a much more prominent place in horticulture in the next few years. The variability of the flowers and the close relationship of the different species offers a great opportunity to the horticulturist who will, using the methods of the "Wizard" Burbank, develop new varieties and brilliant colors.

THE ANNUAL PHLOX.

P. Drummondii, the only annual of the family, is described as erect, branching, 6 to 8 inches tall; the flowers showy, borne in broad, flat topped cymes. This is a native of Texas, where it was collected by Drummond in 1835, and sent by him to Sir William Jackson Hooker, an eminent London botanist, who named it in Mr. Drummond's honor. Hooker describes the color as "pale purple without, within, or on the upper side, of a brilliant rose red or purple tinge, the eye generally of an exceedingly deep crimson." Lindley, who described it in the Botanical Register in 1837, said the flowers are "either light or deep carmine on the inner surface of their corolla, and a pale blush on the outside, which sets off wonderfully the general effect. A bed of this plant has hardly yet been seen, for it

is far too precious and uncommon to be possessed by anyone, except in small quantities; but I have had such a bed described to me, and I can readily believe that it produced all the brilliancy that my informant represented."

P. Drummondii soon sprang into prominence as a popular and valuable garden annual. The colors have varied to many shades; showing a wider range than has been produced in the perennial species. A scarlet, a deep maroon or garnet and a light buff are colors that I do not think have been seen in any of the perennials. A number of double and semi-double varieties have been offered by the seedsmen; but the free-flowering single varieties continue to be the most popular for bedding and general use. The *Quedlinburg* or *Star Phlox* is a horticultural variety of *P. Drummondii* that is very interesting and attractive; the petals are deeply indented, forming star shaped flowers.

P. Drummondii is of the easiest culture; requiring only a warm sunny place. It will thrive and bloom until mid-summer in a poor soil; but if planted in rich soil and given good care it will continue to bloom until fall. It is one of the earliest annuals to come into bloom and is usually planted in the open. It may be planted in-doors or in the hot-bed, but if one wants strong plants with stems of sufficient strength to hold up the large clusters of flowers, they should be transplanted just as soon as they are large enough to handle, setting the plants about 8 inches apart. The volunteer seedlings can be transplanted in the spring and will often bloom earlier than those planted in the seed bed, and a few stray plants allowed to grow up in the beds and borders make bright spots of color in unexpected places.

As to insect enemies and disease, the phlox seems to be practically free from them. There is a phlox worm, the larva of a moth (*Heliothis phlogophagus*) very similar to the boll worm moth that has made so much trouble in the cotton fields. I can find no record of its having appeared in this part of the country and do not think there is any danger of its ever becoming a serious pest. The stem borers that attack almost every herbaceous plant in the garden, rarely are found in the woody stems of the phlox, as the hollow and pithy stemmed plants are their natural hosts.

The foliage is always neat and free from rust and blight.

DISCUSSION.

Mr. Cranefield: I would like to ask whether it is practicable in order to retard the period of bloom to cut off the top before the buds are set.

Mr. Tiplady: You can do that, but you get an inferior blossom. You encourage the lateral growth which is inferior to the terminal bud.

Mr. Geo. J. Kellogg: Did I understand you to say that the Drummondii would not come true from seed?

Mr. Drake: The seed I buy comes very true to color. They must be raised separately and kept separate, but I have had no trouble whatever with odd colors coming in the Drummondii. It is very seldom that a new valuable variety is originated. I could not say how many hundred, but nearly every nurseryman has a list of from 25 to 100, and you seldom see the same name in two catalogues.

Mr. Geo. J. Kellogg: Do you recognize the best white that is on the table here (indicating)?

Mr. Drake: It is one, the name of which I am in doubt. I am told it was the Puritan, but I am not sure.

Mr. Jos. Reek: What kind of soil do you recommend for Phlox Drummondii?

Mr. Drake: It would grow on almost any soil. The soil should be well drained, at least so it will not bake in the hot summer months, and if they are watered during the hot summer months they will bloom until frost, otherwise they die down the middle of August.

Mr. Reek: Can the blooming be improved by mulching during a dry summer?

Mr. Drake: I think it might.

Mr. Tiplady: Treatment of that kind is advisable for all plants that grow.

DELPHINIUM AND AQUILEGIA OR LARKSPUR AND COLUMBINE.

ALFRED MEIER, Madison.

These are two of our old fashioned and hardy perennials. They belong to the Crowfoot family. In the wild state, they are worthy of much praise, but under the influence of culture they have both developed until they rank high as standard hardy perennials for grouping or for the hardy border. Being very hardy they will withstand our severe climate well and when once well established will withstand weeds and grass which is especially true of delphinium, and so can be well recommended for the farmer's garden or lawn.

Fine clumps of larkspur may often be seen growing in the lawn apparently in the sod but of course they cannot be expected to compete with those which have received the best of care and treatment. They appear best in groups or singly in the hardy border.

DELPHINIUM OR LARKSPUR.

Delphinium derives its name from the Greek, a Dolphin, as the flower resembles the fish of that name. There are about sixty species in the north temperate zone. We have three species native to this country:

D. exaltatum, or tall larkspur, two to five feet high, and is a purplish blue; it flowers in July and is found in the borders of woods.

D. tricorne, or dwarf larkspur six inches to three feet high, bright blue, sometimes white, and flowering in April and May; root a tuberous cluster; found in the northern states; much used and best for rock work; in midsummer it will die down and appear as though dead.

D. azureum, one to two feet high, sky blue or whitish, flowering in May and June; these are often used in cultivation, especially in the wild garden; it is found from Wisconsin to the Dakotas and south.

There are many other varieties in cultivation derived from various sources and ranging in color from pure white and a



Perennial Larkspur. The specimens in the foreground are of a double flowered variety.



Herbaceous perennial borders.

beautiful lavender up through every shade of blue to deep indigo and purple, and several shades being blended in some varieties.

There is also a variety Zalil, introduced from Persia, which has beautiful large yellow sulphur blossoms; it flowers in June and July.

The principal species in cultivation are:

D. formosum, derived from Asia Minor; flowers blue with indigo margins; flowers in June and July; very popular especially for groups; growing from two to five feet high. This species is the foundation for many of the beautiful varieties now in cultivation. It has been used for seed parent for cross fertilization with other species, producing some of the finest Hybrids.

D. Hybridum, also stands high on the list; flowers blue, white bearded; flowers in June and August; origin in mountains of Asia.

D. grandiflorum, two to three feet high; flowers large, blue varying to white with often blue and yellow on the same flower; flowers in July and August; origin Siberia.

D. Chinense, is a variety of *D. grandiflorum*; originated in China; very popular garden form; both single and double flowers, the double known as Breckii.

There the many other species too numerous to mention in such a short paper. These species are again divided into many varieties of which our principal growers have their favorites and own introductions.

PROPAGATION.

They are propagated in three different ways by root division, by cutting and by seed.

First—By root division in fall or spring; cut down plant in July or August, then they break up freely from the roots. By careful division a number of off-sets can be obtained; potted in small pots in fine light soil, placed in a cold frame and by spring make good plants for planting out.

Second—By cuttings in early spring when growth is three or four inches high or from the second growth which comes after the flower stems are removed; root in a frame, shaded, no bottom heat being required; sprinkle often during dry, hot weather and when rooted treat like seedlings.

Third—By seed sown in greenhouse or hot-bed in March or earlier; the best time to sow the seed is as soon as ripe as it hardens its seed-coat and is then hard to germinate; transplant as soon as large enough and give plenty of room to grow; they can be set out in a permanent position if protected. Plants started in March will flower in the same season.

CULTIVATION.

It thrives in any good garden soil but is improved by a deep, rich, well manured, sandy loam exposed to the sun. Deep preparation of the soil is important. To get the best results they should be lifted every three or four years, the soil well manured and dug deeply, the plants divided and reset, but this is not necessary unless fine flowers are desired, as when once well developed they will withstand much neglect. They should have a dressing of manure every other year. Two good crops in one season may be obtained by cutting away the flower stems as soon as the flowers have faded but no seed will be produced this way as the second crop does not have time to mature. In the fall cover with a few inches of leaves or manure.

AQUILEGIA OR COLUMBINE.

Aquilegia is another well known and popular flower from the same order as *Delphinium*. There is one species of this found in Wisconsin, the common Columbine of America.

A. Canadensis, well known for its bright scarlet, yellow flowers from April to July. There are some beautiful hybrids from this and the blue species. There are also several other species native to this country:

A. Jonesii, found in Wyoming and Montana.

A. formosa, a variety of *Canadensis*, with brick red and yellow flowers; found west of the Rockies.

A. longissima, a pale yellow flower found in the ravines of southwest Texas into Mexico.

A. chrysanthia, a well known and popular variety which differs from the others in its yellow flowers standing erect instead of drooping; found in Mexico and Arizona; flowers from May to August; it is three to four feet high.

There are many other species from Siberia, Japan and Europe, the best known and most popular being the common columbine



German Iris. From a photograph after the specimens had been in transit for 48 hours, showing that Iris blooms may be shipped.

of Europe (*Vulgaris*) ; flowers violet. There have been many varieties derived from this both single and double, ranging from pure white to deep blue also variegated and yellow.

PROPAGATION.

Columbine can be propagated by division but best by seed. It is hard to get absolutely pure seed except from wild plants. The various species in cultivation mix or hybridize very easily and are often very inferior to their parent plants. The seed should be sown in pans or cold frames in March or in the open air in April or May. As most of the seed of the columbine are slow in germinating the soil must be kept moist on top until the young plants are started. If in a cold frame they should be shaded with cheese cloth to retain the moisture and yet admit a circulation of air, which will prevent the young seedlings from damping off. When seedlings are large enough pick them out into another frame or set them in their permanent places, but shade them for a few days.

CULTIVATION.

This hardy perennial prefers a light, sandy and moist soil, well drained and exposed to the sun ; but many stronger species, when of good size, can be planted, and do well, in heavy garden soil.

THE IRIS FAMILY.

W. J. MOYLE, Union Grove.

The iris has been a popular flower with people from the earliest history. It seems that the Greeks named it after the rainbow on account of its many brilliant hues and colors. And I've not a particle of doubt but what Moses as he lay in his ark of bulrushes on the Nile was surrounded with iris and calla lilies or he would never have been found by Pharaoh's daughters, they being led thither by the beauty of the flowers which ever since the dawn of creation have held such an important part

in beautifying and refining the character of every one whom they come in contact with.

One has to but gaze on a field of three or four acres of German iris when in their full bloom to realize the fact that the Greeks were not so far off after all when they thought they saw all the prismatic colors of the rainbow in this flower for such a field is certainly a remarkable sight.

But to take up this subject and treat the entire genus which comprises about one hundred species would be entirely out of place at this time and furthermore a great many of these varieties are more or less tender and consequently of no value to Wisconsin people.

It shall be my endeavor therefore to mention only those kinds that are of true value to us and suggest methods of cultivation and the place I think they ought to hold in our plantings of hardy herbaceous plants.

My first recollections of the iris date back to the little blue flags as we called them that bordered my mother's flower beds, growing as they did with remarkable thrift in the hard clay soil and among the stones that divided the flower bed from the sod. Here they grew and every spring I looked with delighted eyes for the first bud to open, throwing to the breeze its velvety indigo blue petals, this to be followed shortly with many more until the border of iris was a blue ribbon that surrounded the bed.

By the botanists this is known as "Iris Pumila," meaning dwarf, but with the common people it is called the dwarf blue flag and will always hold a little corner of its own in every well kept flower garden.

Speaking in general terms, however, when iris are under discussion our thoughts naturally turn to that species known as the German iris and under this head it might be well to say are classified many sorts that do not belong there. However, to save words and confusion we run them all in as German Iris. The fleur de lis, the national flower of France, comes under this head and would space permit much historic material could be introduced that would show what an important part this flower has taken in the making of history.

Until the Japanese Iris came into existence the German Iris held full sway as on account of their extreme hardiness and bright colors they were to be found in most every garden.

I had an occasion at one time to make a careful study of this flower as they were grown by the acre and consequently when I went into business for myself, I procured a goodly supply of the different sorts and set them out as an advertising medium in my nursery, as nothing will attract more attention when in flower, unless it might be the peony, than a block of this flower in bloom.

As a cut flower the iris will never be a success on account of the great delicacy of the bloom, as it will not stand much handling and it is impossible to ship it.

But for bedding or massing on the lawn or for park work it is one of our grandest flowers we have, so striking and beautiful are its colors.

With me the following named sorts are all considered very fine.

Blue Bird: Medium in height, rich indigo blue, the earliest of all in its class; a very large flower and a free bloomer.

Celesti: A tall grower with flowers of the purest celestial blue, a most profuse bloomer and a good grower.

Florentine: Medium in season and growth. Flowers a beautiful porcelain blue. This is the iris of commerce from which is produced the orris root from which is made the violet scented perfume.

Pallida Speciosa: Medium to tall with large plum colored blossoms; good bloomer.

Madam Chereau: One of the prettiest of the group, a tall graceful grower with pearly white blooms that are nicely frilled with violet.

Queen of the May: The nearest approach to red yet reached with this flower being a bright rosy lavender, and on that account a very valuable acquisition.

Sampson is considered the best of the yellow sorts, its only draw back being that the flower stems are so short, the blooms scarcely reaching above the leaves of the plant.

All the above mentioned sorts can be planted together with the best of effects, in fact it is only when we get them thus arranged that we are capable of appreciating the marked contrast of the different sorts.

Of recent years the Japanese iris have been having their innings and it truly is a noble flower. I have found them not perfectly hardy with me, still if planted in low ground

and given a little winter protection they will amply repay any one for the trouble and care required.

While ours are grown as named sorts, at the present time at least the varieties are so mixed up that scarcely any two firms hit them under the same name, so it would hardly be worth while to mention the names here.

DISCUSSION.

Mr. Treleven: What do you propagate from, the seed or the root?

Mr. Moyle: Increase from the root. The German throws out a root like a finger.

Mr. Treleven: What time do you set them?

Mr. Moyle: In the spring.

Mr. Tiplady: I see I differ with Mr. Moyle when it comes to the matter of defining the Japanese Iris. The reason I asked him to mention the Japanese is because we have the "Inshambi," "Inwongo" and the "Fu-Shan-Go" and dozens of others. In regard to the propagation of the Japanese Iris, we have fifteen varieties and they are numbered and named, but I don't pay any attention to the names. I find three years is the natural life of the Iris. At the end of three years they must be divided as the center becomes hollow, and in order to give them a new lease of life they must be divided into three or four pieces and transplanted into good rich soil with access to plenty of water. They must be kept very wet for a short period, that is just before they come into bloom. After blooming they must be gradually dried off and the roots allowed to become dormant. They are very hardy in my experience. The best way to protect them is to cover them in between the plants with rotten manure, which will incidentally help the plant along in the spring, then cover the whole with six inches of marsh hay and they will come out all right in the spring. I find them very hardy with that care.

Mr. Moyle: In regard to the life of the Iris, it may be the gentleman is correct, but still at the place where I was employed we had them for fifteen to twenty years, but they died out in the center, but they were just a solid mass of blue and

white and other colors. Unless you give them good protection they will be killed out or freeze out. The practiced gardener will give them care that the nurseryman cannot afford to give. We cannot afford to give them the attention which gardeners give. They are not as hardy as the German Iris.

Mr. Menn: Is the Spanish Iris hardy in Wisconsin?

Mr. Moyle: No, it is not, generally speaking. I know it is planted off and on, but as a rule I don't think it is successful in this part of the country.

Mr. Tiplady: It is exactly the same as the Japanese in that respect. It has different kind of bulbs. It is hardy if the protection is given it which has just been mentioned.

Mr. Moyle: One or two of the bulbous Iris have bloomed in the most beautiful way. The crocus belongs to the Iris family.

Mr. Tiplady: I wish some of the members present would give us the succession of the Iris family, commencing with the first to bloom and going through the list.

Mr. Moyle: Those three families I have mentioned, the early Dwarf and the German, then the Japanese Iris, and those other varieties are intermediate between the season. The Crocus will be the first as soon as the snow is off the ground in the spring, then comes the little Blue Eyes, then comes the German Iris, and that will extend over two weeks, then follows the English.

Mr. Reik: How does the English compare with the German?

Mr. Moyle: They are not like the German, but they are both important in their place.

Mr. Geo. J. Kellogg: Speaking of the Iris as an advertising medium for the nurseryman, forty years ago I bought a whole wagon load and set them out and I could not give them away; it cost me \$25 to dig them up.

PEONIES.

A. J. SMITH, Lake Geneva.

The peony is often spoken of as the rival to the rose—it is true in more ways than one—it rivals it in delicacy of color—in fragrance—in form of flower—in popularity—in hardiness—freedom from pests and diseases, and ease of cultivation, it far surpasses the rose.

Great attention given it by growers throughout Europe and America, hundreds of acres being devoted to the cultivation of the peonies, nearly two thousand varieties, known by name, the formation of a National Society.

The only flowers to have such attention are the Carnation, Chrysanthemum and the Rose.

Several peony shows held this year have attracted much attention from the papers and public.

Peony nomenclature is in a muddle, several different sorts being on the market—under the same name. The American Peony Society is conducting at Cornell University a test of many hundred plants, contributed by different growers, in this country and Europe, to straighten out this confusion of names.

Some of the best varieties:

Festiva maxima, a very large, pure white with the fragrance of a rose, has a few carmine marks in the center; this variety has been on the market for a number of years, and is still considered the best.

Golden Harvest for planting on a private lawn, one without a peer, as it is the freest bloomer, outside row of guard petals light pink, balance yellowish, with red markings on a few of the petals—near the center—very showy.

Queen Victoria is considered very fine by florists, because it ships and stores better than most of them; it is full white.

Model. de Perfection, immense massive flowers like a big Chrysanthemum—set on a wide base of guard petals—color clear deep pink.

Beaute Francaise, a light lilac pink.

Edulis Superba, deep pink—very early and one of the most fragrant.

Delicatissima, one of the most in demand of the pinks, espe-

cially among the florists, delicate light shade of fine form and fragrance.

M. Barral, a fragrant dark rose pink.

MASSIVE.

Felix Crouse, one of the so-called bomb-shaped varieties—a rich red.

Purpurea Delachei, one of the darkest reds—with metallic lustre, like some of the very dark roses—the richness of the shade is emphasized by a few stamens.

RUBRA.

Richardson's Superba, still is a different shade of dark red, but without stamens, late bloomer.

Officinalis Rubra Plena comes one or two weeks earlier than the later kinds—a deep crimson—full flower, but rather short stems; in the same class belong *Officinalis Alba* and *Officinalis Rosea*, one a white and the other pink, valuable only on account of their earliness of bloom: not very free bloomers, and not as large as the later varieties.

Whittley়ii, which is a pinkish white, not so very large, but the best keeper among all whites. We have another good white *Festiva*, blooming later than *Maxima*, being of the same color, but not so large. For years it has been called the Drop White on the Chicago market.

Marie Lemoine has a solid color of flesh white, very large full flowers, and compact habit.

In flesh colored pink varieties there are *Euboles*, a very large pink, showing yellow stamens, but very good. *Bryant Pink*, which is a solid color, and a very good keeper—a full sized flower.

Beresford is a delicate rose-tipped crimson, and a large flower.

Rosamond has a bright, clear pink color—a good, large, free bloomer.

This short list of varieties is merely a suggestion, but will serve to illustrate the range of color and habits it is possible to secure.

The culture of the peony, the Chinese herbaceous peony, originated in Siberia, its tuberous roots were used by the Tartars as an article of food—peonies grow in all kinds of soil, but

do best in a deep, rich, rather moist loam. A clay subsoil—if well drained is very beneficial when blooms are desired, but the Tubers ramify more in a lighter soil if grown for propagating purposes. In preparing the bed it should be thoroughly trenched, two feet deep, working in a great quantity of rich cow manure—as they are gross feeders—the ground should be kept well cultivated, and an annual top dressing put above the plants in November, which should be forked in the following spring. Peonies should have a liberal supply of water at all times, and especially when in bloom—liquid manure when applied during the growing season and at a season when the ground is dry, gives good returns, both in the growth of the plant, and size of the bloom in planting, the crown should be set two inches below the surface.

In transplanting, it is a good plan to remove all the old earth, so as to start with fresh unimpoverished soil next to the roots, flowers produced on small divided plants are apt to be imperfect, but when thoroughly established a plant will continue to bloom—if—undisturbed for twenty years. The period of blooming for herbaceous peonies ranges from the middle of May, through the month of June. Cold storage flowers of the old Late Rose were exhibited in fine condition, July 14th and 15th, at the Midsummer Fair, Lake Geneva.

They grow from one to three feet high, and therefore suitable for planting in front of shrubbery.

The single flowering sorts are not as popular as the double ones. They do not keep so long when cut, and fade more rapidly when on the plant.

Peonies, like most tuberous plants when dormant, stand considerable exposure, and can be shipped long distances in safety—small plants need two or three years after transplanting to recover their natural vigor—until firmly established in the soil they will not produce many blooms or very large.

The Peony is of great value as a landscape feature, and cut flowers, the clean dark green foliage, is quite in contrast to any other group of plants.

The Peony is never attacked by any insects, animals or fungal diseases—they do not require any covering during the severest weather—in fact they are among the most hardy, showy and easily grown of all garden flowers. Undoubtedly the Peony is one of the most effective of all early flowering herbaceous

plants for use in extensive landscape planting. It can be used in masses producing grand results; they can be interspersed among shrubbery, lending additional color to such groups. When out of bloom the plants are not sightly as is the case with many other herbaceous flowers, but the deep fresh greens and bronzy greens of the peony foliage are maintained in general good condition. The range of peony colors is unexcelled, it comprises almost all the shades of pink, from the most delicate flesh tints to the deepest, the same may be said of white, crimson and purple, in yellow however it is weak, there is no good color of yellow.

DISCUSSION.

Mr. Geo. J. Kellogg: What is the name of those early varieties, those called the old fashioned red?

Mr. Smith: *Officinalis rubra*.

Mrs. Marcia Howlett: Has anyone ever grown a peony with a very fine cut foliage like the *Cosmos*?

Mr. Tiplady: That is the *Tumefolia*. It is a very rugged flower. There is usually one flower on the terminal bud.

Mr. Smith: The tree peony is just as hardy as the other, but they do not last as a rule, they drop quicker. They are quite as hardy.

Mr. Moyle: I am glad to know that. I was under the impression that the tree peony was not hardy. How high do they grow?

Mr. Smith: They grow five feet high.

Mr. Moyle: And are perfectly hardy?

Mr. Smith: Yes, except you had better mulch them around the roots.

Mr. Drake: Have you ever found any trouble in keeping down the suckers around the roots?

Mr. Smith: No, I have found no difficulty.

Mr. Moyle: How do you propagate the tree peony?

Mr. Smith: All I have I have grafted.

Mr. Treleven: It is a very slow plant to propagate. It is of very slow growth. Of course, it is hard to get stock, and

I have never found any difficulty in securing success with suckers, but they have been of very slow growth.

Mr. Moyle: You can graft on herbaceous roots.

Mr. Reik: I would like to inquire whether this tree peony has been grown with success north of Oshkosh. I have a number of friends who have been trying to grow it but they met with a great deal of disappointment. I am thinking of trying it myself. I understand they are meeting with success in its growth in northern Illinois and southern Wisconsin, but I do not know whether it would winter here. We have some very severe freezes and I understand a great many of them are lost. Furthermore, I would like to ask the gentleman his opinion in regard to the beauty of the flower compared with other peonies.

Mr. Smith: I do not think so much of the tree peonies as I do of the others; they are short lived.

Mr. Reik: You do not think the average grower would meet with as much success and be as well satisfied with the tree peony as with the ordinary varieties?

Mr. Smith: No, sir, I don't think so.

Mr. Reik: There is nothing into which you can put your time and money with such a guaranty of good results as the peony.

Mr. Smith: The peony does not want to be confined much. After it is well established it will keep from twenty to thirty years.

Mr. Cranefield: I just wish to say one word in regard to the endurance of the peony. In the cemetery at Madison there is a clump growing that has blossomed every year for ten years to my knowledge, and as near as I can learn the clump was set out soon after the grave was made, and the tombstone bears the date of 1864; so it has been set out forty years and still continues to bloom.

THE DAHLIA.

W. S. BROWN, Madison.

The Dahlia is one of the best known and most important of our garden flowers. It belongs to the family, Compositae. Its original home was in Mexico, Central and South America. Although there are many names of species applied to this genus, most of them are synonyms, and may be resolved into eight or nine fairly distinct species. Most of the dahlias in cultivation have come from *D. Variabilis*. This species is the parent stock of our show, fancy and pompon varieties. The other common species is *D. Juarezii* from which the cactus types have sprung.

The Dahlia is closely related to the *Cosmos* and *Coreopsis*, and to the common weed, beggars tick. These relatives, the dahlia has surpassed both in the habit of doubling and in the profusion of colors. Its range of color, particularly, is very wide, lacking only the sky blue and closely allied colors. In this respect it surpasses its rival, the *chrysanthemum*.

The dahlia has been cultivated in Europe since 1789. Up to 1814 there were several well-defined colors among single dahlias, but until that year doubling had not begun. The doubling of this flower gave its cultivation a great impetus, and it soon became very popular. In 1841 one English dealer alone had 1,200 varieties listed in his catalogue, and it is estimated that at the present time over 3,000 varieties have been listed.

From 1841 on, little improvement was made, except in variety of color, until 1879, when the first cactus dahlia was introduced into England, and another field of development was opened up. The parentage of the cactus dahlia is uncertain; some claiming it to be merely a sport. of *D. Variabilis*, others that it is a separate species. Certain it is that a Dutch dealer obtained the root from Mexico which was the progenitor of the cactus type. The new find was named *D. Juarezii*, in honor of Pres. Juarez, of Mexico. This variety is still in cultivation, and may be found on catalogue lists.

Shortly after our Civil War there came a reaction against formalism in landscape art of all sorts. The round, regular

head of the dahlia suffered with the others, and it has been only within recent years that the flower has regained some of its old-time popularity.

Briefly, there are nine different types of dahlia recognized, based upon the size of the plant and upon the size, shape and color of the flowers. We can, however, include most of the popular kinds in four or five general types or groups.

First of all, both in time and importance, come the Show and Fancy Dahlias. "A Show Dahlia is often of one color; but if the edges of the rays are darker than the ground color, the variety can be exhibited in the Show section. A Fancy Dahlia always has two or more colors, and if the rays are striped, or if the edges are lighter than the ground color, the variety must be exhibited in the Fancy section." The pompon type differs from the Show and Fancy types chiefly in size and prolificacy. The flowers are much smaller and more abundant. They make a very good variety for massing.

In 1881, when the reaction against formalism was at its height, the Single Dahlia became very popular, and is still used, to some extent in plantings for natural effects.

The above mentioned types have been brought to a high degree of perfection by long and patient training, and it would seem that there is relatively little chance for improvement. On the other hand, the cactus type is comparatively new and offers many chances for the enthusiastic propagator of new varieties. Another type which promises much in the future is the rather indefinite Decorative or Cactus Hybrid type. These flowers have been largely seedlings from Show Dahlias and their rays are rarely if ever curved at the margins.

Evolution and Improvement: The dahlia has had many friends; as proof of this it is only necessary to note the number of Dahlia societies in this country and in England. Interest in the flower became manifest early in its cultivation, and, as a result, evolution was rapid. Some points of improvement we may briefly note: (1) The shortening of the growing season. Formerly dahlias blossomed about two weeks before frost in this latitude, now we may have them for the Fourth of July. (2) The colors have been improved and variegated forms increased. (3) The doubling process has been perfected. (4) The habit has been changed from a tall, ungainly plant, which had to be supported on a stick to a low-branch-

ing, symmetrical, bush-like form. In this change of habit the stems of flowers have been developed longer, and now, the dahlia is popular for cut flowers. .

We will turn, now, from this very brief history to the more interesting phase of the subject to many of us; the cultivation of the dahlia.

Dahlias are propagated in four different ways: By seeds, by cuttings, by grafting, and by division of root stocks. The first method is used when new varieties are to be obtained, and when mass effects without much regard to color are desired. Propagation by cuttings is the chief method of commercial growers and grafting is used to preserve weak or rare varieties, but neither of these is so suitable for the amateur as the last named method propagation by division of roots. This is done by dividing the root clump into as many divisions as there are tubers, as a rule, taking care that there is an eye present for each division. The eyes come not on the tuber, but on the crown and sometimes may best be started by placing in damp, warm place some time before dividing.

Such tubers may be planted about two weeks before danger of frosts is over; it will take them that long to push up through the soil. If small roots or green plants are used they should not be set out until danger from frost has past. Plant in rows four feet apart, and from eighteen inches to three feet apart in the row. Any good soil with plenty of humus and plant food will raise good dahlias. In general we may say that good corn land will grow them to perfection.

Commercial fertilizers are used to a large extent, but are best when mixed with well rotted manure. The manure should be well incorporated into the soil by spading or plowing. Thorough preparation and tillage of the soil are vital to the successful culture of this flower. In its younger stages the dahlia grows very rapidly and should be kept deeply and thoroughly tilled, but when older, deep tillage should be dispensed with as it is almost fatal to the production of bloom. When the plants begin to blossom, stir the soil frequently and thoroughly from 1-3 inches deep and never allow the surface of the soil to become baked.

There are great differences of opinion regarding watering but some of the best authorities prefer to water little except in time of prolonged drought and to depend instead upon con-

servation of moisture by means of a surface mulch made by cultivation.

With dahlias, plants which, naturally, grow tall and top-heavy trimming is an important feature. In planting place the tubers on their sides with the eye as near the bottom as possible, cover 2-3 inches deep. As the shoots come up pinch off all but the strongest one and pinch off the top of that shoot as soon as two or three pairs of leaves have formed. This induces branching under ground and a bush like form which is stronger and more symmetrical.

When the tubers are gathered in the autumn, they should be well cleaned and placed in a fairly dry cellar free from frost. If the air is too dry or there is danger from frost they may be packed in sand or sawdust.

The varieties a person should grow depends upon the tastes of the person and upon the purpose for which they are grown. For cut flowers the cactus hybrids, show, fancy and single dahlias are used. Varieties such as Grand Duke Alexis, large, chiefly white, Wm. Agnew, scarlet, Orange King, orange, etc., (C. W. Bruton, red and yellow) are good hybrids; (A. D. Livoni, pink), (Queen of the Yellows, yellow) (Purity, white) etc., are examples of the Show sorts; and Frank Smith, white, red margin, American flag, uncertainty, illustrate the Fancy type. For bedding, plants must be dwarf and profuse bloomers. Matchless (cactus maroon).

The dahlia has but one enemy of much importance, the tarnished plant bug. This insect is responsible for blasted bugs and flowers, and for withered, blackened shoots.

Bibliography, *The Dahlia*, Lawrence K. Peacock (1897).

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DISCUSSION.

Mr. Tiplady: My experience teaches me that the dahlia must be planted in low ground, for the reason that it is in that way easier to avoid the appearance of the red spider which is so destructive to the foliage of the dahlia, and if it gets a foothold

you will not have a blossom. Where the ground is dry that is where the spider likes to live, but on low ground he will not live.

Mr. G. J. Kellogg: In wintering dahlias last season I dried them well and put them in boxes, and when I set them out in the spring they nearly all failed. I have heard some say they put them in the potato bin which would furnish them about the right amount of moisture.

Prof. Brown: You do not want to let dahlias get too dry. It has been advised to leave them after cutting off the tops, in the sun for about a week before removing them to the cellar, and then keep them in a fairly moist cellar, not too dry. If you get them too dry and keep them too warm they are pretty sure not to develop.

Mrs. Marcia Howlett: If the cellar is too moist they will rot?

Prof. Brown: Oh, yes, it will not do to keep them too moist.

Mrs. A. D. Barnes: Did you ever try drying them in the sun before putting them in the cellar?

Prof. Brown: Yes, they are dried just the same as potatoes, but they do not need so much fresh air.

Mrs. Barnes: Would you advise putting them directly from the row into the cellar?

Prof. Brown: That depends on the condition of the ground when you dig them. If it is wet you had better leave them on the surface until the dirt is dry enough to rub off and then put them in the cellar.

Mr. Watson: In wintering dahlias first take the top off and then leave them out long enough to dry them off, and then put them in a cool cellar and in a dry soil, and I do not believe I ever lost a dozen roots in my life.

Mr. L. G. Kellogg: The best way to keep dahlia roots successfully is to put them in the cellar, letting them dry partially for two or three days and then packing them in barrels with small potatoes. I never had any trouble in keeping them in that way.

Mr. Tiplady: I saw a dahlia that stays out all the time. The gardener told me so and I believe him. All gardeners that have greenhouses put them under the bench and keep them between moisture and dry. If my observation is correct, and I think it is the dahlia that is known by the name of Sylvia is undoubtedly the finest known up to the present time. The bloom, shape and color is good, it is a good pink. I take pleasure in announcing that the Sylvia supersedes any variety I know of.

Mr. Periam: I have cultivated dahlias for fifty years, and I have never had better success in wintering them than putting them loosely in barrels and sifting in sand. The next best way is to put them in a cellar just moist enough to winter potatoes. Where the potato will winter in first class shape the dahlia is pretty sure to do so.

PREMIUM LIST, SUMMER MEETING.

Oshkosh, Aug. 29th, 1905.

FLOWERS.	1st	2d
	Prem.	Prem.
Best display Asters	\$2.00	\$1.00
Best display Comet Asters50	.25
Best display Branching Asters50	.25
Best display Quilled Asters50	.25
Best display Single Dahlias	1.00	.50
Best display Double or Show Dahlias.....	1.00	.50
Best display Cactus Dahlias	1.00	.50
Best display Gladiolus	1.00	.50
Best display Perennial Phlox	1.00	.50
Best display Pansies	1.00	.50
Best display Stocks	1.00	.50
Best display Single Petunias	1.00	.50
Best display Double Petunias	1.00	.50
Best display Double Verbenas	1.00	.50
Best display Cosmos	1.00	.50
Best display Golden Rod	1.00	.50
Best display Native Asters	1.00	.50
Best display Native Ferns	1.00	.50
Best display Wild Flowers	2.00	1.00
Best display Garden Flowers	2.00	1.00
I'est. most artistically arranged, bouquet or vase of garden flowers	1.00	.50
Best, most artistically arranged, bouquet or vase of wild flowers	1.00	.50
Best exhibit flowers, to be judged by the following scale of points:		
No. of varieties shown	75	
Quality	15	
Correct nomenclature	10	5.00
		2.50

FRUIT.

APPLES.

Best plate Astrachan	1.00	.50
Best plate Early Harvest	1.00	.50
Best plate Early Joe	1.00	.50
Best plate Oldenburg	1.00	.50
Best plate Tetofski	1.00	.50
Best plate Transparent	1.00	.50

PLUMS.

Any variety named in Society Fruit List (1904)50 .25

Specimens of plums must be fully colored and ripe enough for culinary use.

Four apples to be shown for a plate.

In plums not less than ten specimens shall be considered a plate.

FOR THE YOUNG PEOPLE.

Premiums for displays of flowers grown by boys and girls under 14 years of age.

	1st	2d	
	Prem.	Prem.	
Best display Asters	\$1.00	\$.50	
Best display Dahlias	1.00	.50	
Best display Gladiolus	1.00	.50	
Best display of garden flowers other than above...	1.00	.50	
Best display wild flowers (collected by exhibitor) ..	1.00	.50	

PREMIUMS AWARDED.

At the session Tuesday afternoon premiums for flower displays were awarded as follows, the judges being W. J. Moyle of Union Grove and A. J. Smith of Lake Geneva:

Asters—First, Mrs. L. W. Barnes; second, Mrs. D. D. Howlett.

Comet asters—First, Mrs. Barnes; second, C. Phillipson.

Branching asters—First, Mrs. D. D. Howlett; second, C. Phillipson.

Single dahlias—First, R. J. Coe; second, Mrs. Barnes.

Double dahlias—First, Mrs. Barnes; second, Mrs. W. E. Thrall.

Caetus dahlias—First, R. J. Coe; second, Mrs. Barnes.

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Gladiolus—First, R. J. Coe; second, Mrs. Barnes.

Perennial phlox—First, G. M. Snyder; second, R. J. Coe.

Pansies—First, Mrs. J. J. Ihrig; second, Mrs. Barnes.

Stocks—First, Mrs. Barnes; second, H. C. Christensen.

Single petunias—First, Mrs. Barnes; no second.

Double petunias—First, Mrs. D. D. Howlett; second, Mrs. Barnes.

Verbenas—First, James W. Stephens; second, Mrs. W. E. Thrall.

Cosmos—First, H. C. Christensen; second, Mrs. Barnes.

Golden rod—First, C. Phillipson; second, Mrs. Payton.

Native asters—First, Mrs. D. D. Howlett; second, Mrs. Marcia Howlett.

Native ferns—First, Mrs. Marcia Howlett; second, Mrs. D. D. Howlett.

Wild flowers—First, Mrs. Marcia Howlett; second, C. Phillipson.

Bouquet of garden flowers—First, Mrs. Barnes; second, C. Phillipson.

Bouquet of wild flowers—First, Mrs. Payton; second, C. Phillipson.

Sweepstakes—First, R. J. Coe, Ft. Atkinson; second, Mrs. L. W. Barnes, Waupaca.

YOUNG PEOPLE'S DISPLAY.

Asters—First, Fern Payton; no second.

Gladiolus—First, Burleigh F. Howlett; no second.

Garden flowers—First, Shirley Holmes; second, Fern Payton.

Wild flowers—First, Fern Payton; second, Burleigh Howlett.

AWARDS ON FRUIT.

The following awards of first and second premiums on the display of fruits were made by the judge, L. J. Kellogg of Ripon:

Apples, Astrachan—First, J. W. Stephens; no second.

Eearl harvest—First, J. W. Stephens; no second.

Oldenburg—First, M. V. Sperbeck; second, Mrs. Payton.

Tetofski—First, M. V. Sperbeck; no second.

Transparent—First, M. V. Sperbeck; no second.

Plums, Green Gages—First, H. C. Christensen; no second.

Transactions of the Winter Meeting.

MORNING SESSION.

MADISON, WIS., February 6, 1906.

The meeting was called to order in the assembly room of the capitol building at 10 o'clock A. M. President T. E. Loope in the chair.

PRESIDENT'S ADDRESS.

DR. T. E. LOOPE.

Since we last met in annual conclave your officers have had many and varied duties to attend to and while it has seemed uneventful compared to a year when an exposition was in progress, for that reason we have not been so prominently in the public eye yet. I believe our work has tended toward laying the foundation for future usefulness and the dissemination of horticultural truth.

A gratifying item is the increased membership over other years. This has not come by reason of our auxiliary societies but has come from widely scattered localities where interest has been awakened in our work by people who have horticultural interests or instincts irrespective of local societies. It would seem that our local societies are built and maintained very largely by one or more enthusiastic persons who are willing to expend much valuable thought and time for the benefit of the

many, who have no care beyond being amused or absorbing knowledge from others. This is putting it mildly and those of us who have worked in this field know it to be absolutely true in a general sense. Even then many local societies, containing members who are enthusiastic and eminent in horticultural work have collapsed from sheer indifference of the members.

This is unfortunate for the state society for with well organized and helpful auxiliaries in all sections of our state our prestige would be vastly increased and our usefulness extended. As it is now we must force a recognition of our beneficent work by main strength from the fountain head and instead of many streams on which to float our leaves of knowledge we must blow them upward trusting to chance winds to carry them home to the seekers after more light.

Horticulture stands in similar relation to agriculture as literature, music and the fine arts do to scientific education. As an adjunct to agriculture it goes beyond the mere tillage of the soil for the profit there is in it and puts on the finishing touches and delicate furnishing to what would be ordinary coarse living without change or diversity. Agriculture gives you bread, potatoes and meat for the substantial muscle building diet. Horticulture adds fruit in endless variety which gives infinite zest to appetite and stimulates digestion which enables one to assimilate the coarser and more strengthening food. It adds flowers to please the eye and leads one through pleasant ways nearer to nature and the contemplation of higher ideals and nobler actions. To the human race it stands a close second to agriculture.

Believing this assertion to be essentially true we nevertheless find that agriculture is a power that commands great attention in all our great educational institutions and is supported by an imposing array of professors and a vast amount of money appropriated by the state. Horticulture on the other hand has had to struggle along with few teachers in our institutions. State horticultural societies like our own, that have made a study largely a labor of love, are recognized by small appropriations utterly inadequate to its pressing needs and the importance of its mission.

Believing in the advancement of the science and practical work of horticulture as an essential and valuable asset to the state for the general happiness and comfort of our inhabitants,

for the more refining influence of the home and the health giving properties of its products, we should seek some means for substantially advancing our cause in the estimation of the masses. I believe our remedy consists in gathering into our membership men who are factors in political affairs, men who will voice our necessities (and objects in the legislative halls). Every member should use his best efforts to see that the legislator in his district is favorable to our cause. Educate him in the elements of horticulture. Make it a personal duty to do this. When this has been accomplished we can widen our sphere of action and spread the gospel of horticulture to every household.

Our society has at present a fair appropriation for the work as it has been in the past, but with plans as outlined for the future we shall be seriously handicapped unless we can see an increase when the legislature meets.

Our trial orchards require an increased outlay to properly care for and keep them in good condition. In addition to those already planted the society has located one in Barron county, and has taken preliminary steps towards one in Marinette or Oconto county. If we do this missionary work we will surely need more funds to carry our experiments to a practical and intelligent consummation.

We deserve recognition and must secure it. It would seem that every progressive horticulturist should make it a duty to attend the winter meeting. The cost is not excessive and the stimulus received keeps alive the enthusiasm so necessary to the successful prosecution of his vocation. Cowper hits the nail on the head when he says:

“How much the Dunce who has been sent to roam
Excels the Dunce who has been kept at home.”

If there are those who think we have not accomplished as much as we ought, I have this to say to them, that I believe every officer of our society has its best interests at heart and have intelligently and earnestly without thought of selfish ends, worked as they thought best for its advancement. The main thought has been to secure the greatest good to the greatest number—to popularize the work—to present the best thought as widely as possible—to give correct and up-to-date information—to keep ever before the public the importance of the society to the whole commonwealth. You have in your ranks men of

wide practical information, acute business sagacity and versatile accomplishments in their lines. There are no abjectors or dis-organizers, consequently we should be a happy family.

It is no disparagement to others to speak of the efficient and energetic labor of your Secretary. Upon his shoulders rests largely the weal of your society. He is untiring, intelligent, enthusiastic and in a comprehensive slang "Johnny on the spot." I desire to say that with these happy combinations my office has been a pleasure to me and the associations connected with it are the source of great satisfaction.

REPORT OF SECRETARY CRANEFIELD.

The record of this society for 1905 is one of distinct progress. We are moving ahead at a rapid pace.

The membership roll now includes 350 names. These are all either life or annual members whose dues are paid in full. We carry no dead timber. As soon as a membership expires the member is notified and if the renewal fee is not received within a reasonable time his name is dropped.

The increase in membership since my last annual report is 133 or a gain of 62 per cent.

While this increase is not as much as we all desire the increase in interest has been very marked. While in the past many of our annual members renewed from a sense of duty or from force of habit the prestige of membership in our society is now coming to be valued.

The trial orchard work is attracting wide attention and favorable comment. Applications for our bulletins are steadily increasing and extracts from these as well as reports of our conventions have appeared in the agricultural press throughout the United States.

Our delegates who have visited other states report most gratifying comments on the work of our society.

On the whole it seems fair to report the society in a prosperous condition. A report of the transactions of the society follows:

REVISION OF THE CONSTITUTION.

At the last annual meeting a revision of our constitution and by-laws was adopted.

The revised constitution includes the following new features, given in the order in which they appear in the revised document.

1. The appointment of the secretary by the executive committee.
2. Abolishing the office of corresponding secretary.
3. Provision for the election of members of the executive committee from the different congressional districts by the delegates elected by the local societies in each district.
4. An article defining local societies.
5. Fixing Madison as the place of meeting for the annual convention.
6. An article creating a board of managers consisting of the president, treasurer and secretary, empowered to conduct the business of the society in absence of the executive committee.

The revision of the by-laws provide:

1. That the secretary shall also be superintendent of the trial orchards subject to the direction of the trial orchard committee.
2. Providing for regular bi-monthly meetings of the board of managers.
3. Defining the duties of the trial orchard committee and providing for an annual inspection of all of the trial orchards by this committee.

The provision creating the board of managers has aided materially in placing the society on a sound basis in the transaction of business.

The board held six meetings during the year as follows:

Madison, February 10th.

Milwaukee, March 28th, June 3rd, August 4th, October 6th, December 4th.

Oshkosh August 29th.

Three meetings of the executive committee were held. At Madison February 6th and 10th and Oshkosh August 29th.

A detailed report of the proceedings of these meetings is on record in the secretary's office and will appear in the printed transactions for 1906.

ANNUAL REPORT.

The annual report for 1905 a volume of 329 pages was delivered by the printers May 1st and about 2,000 copies have been distributed from the secretary's office as follows:

County clerks.....	890
Short course students.....	325
Members	350
Individual requests.....	120
To exchanges etc.....	300

	1,985

BULLETINS.

Four bulletins have been issued during the year.

No. 4 spraying, March, 1905, 25 pages, 18 illustrations; 2,500 copies; cost of printing \$70.00.

No. 5. Fire blight, May, 1905. 8 pages, 1,500 copies, cost of printing \$16.50.

No. 6. A preliminary orchard survey of the Kickapoo river region October, 1905. 11 pages; 750 copies, 4 illustrations: cost of printing \$22.50.

No. 7. Buying nursery stock December, 1905; 1,500 copies, 8 pages; cost of printing, \$16.50.

Of bulletins 1, 2 and 3 issued in 1904 the supply is exhausted. Several hundred copies each of Nos. 4 and 5 remain and about 100 each of Nos. 6 and 7.

The bulletins have been generally well received and if we could by any means learn what the people need I am satisfied our bulletins would become a most important feature of our work.

The remarkable demand for No. 7 illustrates this. This bulletin was issued, I will frankly state, to fill a gap, to complete the quarterly issue for 1905 and contains but little else than the fruit lists taken from the annual report and yet the demand for this has exceeded that of all others combined, while bulletin No. 4 on spraying for which it was supposed there would be a wide call remains undistributed.

Other publications during the year include a list of herbaceous perennials and different forms of advertising matter.

The summer meeting at Oshkosh was well attended and marked by unusual interest on the part of all present. The pro-



Partial views of exhibit of Wisconsin State Horticultural Society at Dane Co. Fair, Madison, Sept. 19-22, 1906.

gram, devoted wholly to the discussion of a single class of decorative plants, was well received. The exhibit of flowers, including both cultivated and native, was probably the most extensive in the history of the society.

The society exhibit at the state fair included a collection of photographs illustrating the work of the society, models of grafting, pruning and budding as well as an extensive exhibit of fruit from the Wausau orchard and about a hundred plates contributed by members.

While the state fair exhibit cost about \$120 it is believed that we received full returns in advertising and increased membership. A portion of the exhibit was installed at the Dane county fair at Madison but the returns were not satisfactory.

LOCAL SOCIETIES.

The local societies that reported last year are all represented here today and will inform you of their work as called on. In addition it is with much pleasure that I record the association with this society of the Lake Geneva Foremen's and Gardener's association of Lake Geneva, a newly organized local society of great strength. This society is composed exclusively of skilled gardeners and every member is also a member of the state society. The great interest manifested by the members of the Lake Geneva society in the work of the state society and their union with this society in a body is to be commended to the other local societies of the state of which less than two per cent are members of the state society.

CONCLUSION.

This is a brief review of the work of the society for the past year. It would seem fitting in conclusion to look ahead to the coming year.

The society is now working on broader lines than ever before in its history; these must be strengthened and other fields of usefulness included.

The trial orchard work is greater than any ever undertaken heretofore by a state society and when carried to completion will stand as a monument to those who conceived and executed it.

While the trial orchards are bound to prove of inestimable

benefit to the people of northern Wisconsin they absorb a very large part of our attention and resources. I recommend a diligent prosecution of the work as at present established without further enlargement. The five orchards now located, cover practically all of the different undeveloped conditions of northern Wisconsin and the establishment of more would be merely a duplication of the present work. In aiming to develop the resources of the state the southern half should not be forgotten. The possibilities of tree-fruit culture in southwestern Wisconsin have been briefly outlined in bulletin No. 6. The people of this region need only an awakening and intelligent direction to develop one of the best and most productive apple regions in the west and I have no doubt that there are other sections of southern Wisconsin where questions of hardiness, etc., were settled by the pioneers in our society 50 years ago, which await only a demonstration of their resources to make of them productive fruit regions.

Co-ordinate with the encouragement to plant trees must come a demonstration of the means of protecting them from insects and diseases. No more practical and helpful work could be undertaken by this society than well advertised public demonstrations of spraying in different localities in the state.

These and similar lines of work show the almost unlimited opportunities which we possess to benefit the people of Wisconsin.

The Wisconsin State Horticultural society now stands on a widely different basis than the society of twenty-five or fifty years ago. In the beginning when the society was supported financially by the contributions of the members it was but reasonable that the benefits accruing from the association should be largely for the members. Now that we solicit and accept the bounty of the state of Wisconsin we must endeavor to give to *all* of the people of the state just returns for this aid. We can no longer feel that our funds, coming as they do from all of the people of the state are to be expended exclusively for our own benefit. It is right and just that the members, those who pay a fee and thus manifest an interest in the society should receive direct benefit when possible, and as your Secretary I have spared no effort to give help to all who have asked it.

Certain prerogatives are and should be inherent in membership but a membership should also imply an obligation to labor in a wholly unselfish manner for the advancement of the so-

ciety's interests and the reward for this must be in a consciousness of a duty well done. The individual members, *only*, can make this society the largest and most influential in the United States.

The officers, to whom are intrusted many duties, must be diligent and faithful in the discharge of these duties but in order to accomplish that at which we aim there must be co-operation on the part of every member. When the time comes that every member asks, not "how much can I get from the society, but how much can I give to the society of my time and influence," then and not till then will we be on the road to the highest success.

REPORT OF SUPERINTENDENT OF TRIAL ORCHARDS.

F. CRANEFIELD.

Many facts relating to the trial orchards for the past year will be omitted as two reports by the trial orchard committee follow.

WAUSAU.

This orchard was visited but three times this year, viz.: in April, July and September.

In April seventy-eight apple trees were planted to fill vacancies,—25 wealthy, 25 N. W. greening and 28 of other varieties.

The orchard was sprayed three times with Bordeaux combined with Swift's Arsenate of lead. In spite of this the fruit was very seabby and quite wormy. The foliage was comparatively free from the scab fungous. This is in marked contrast to the season of 1904 when the fruit was absolutly free from worms and almost free from scab.

I hesitate to give what I believe to be the reason for this condition lest it be construed as self-praise and yet my convictions are so strong that it must be stated. It is this:

The spraying was not properly done. In 1904 I superintended the spraying and if you will permit me to say it the spraying

was thoroughly done. In 1905 I relied on the man in charge who expressed the greatest confidence in his ability to do the work properly. The results were very apparent.

There is one very important point in spraying for codling moth and scab that is apt to be overlooked viz., that every apple must be covered with the spray; spraying the leaves will not protect the fruit.

The rainy season interferred with cultivation at Wausau as in the other orchards but toward the end of the summer the grass and weeds were subdued and a cover crop of oats sown.

A fair crop of fruit was borne by all varieties of apples except N. W. Greening and Wealthy. Hibernal, Longfield and Patten Greening were especially well loaded. Cherries and plums were also a fair crop. The cherries were sold on the trees to Gilman & Rick of Wausau as was later the entire apple and plum crop. The trouble reported last year as affecting the N. W. Greening trees has not abated. Several of this variety perished last year and the disease has extended to adjacent rows of Wealthy.

Specimens including the trunk of an affected tree were sent to Prof. Galloway at Washington who pronounced the disease Sphaeropsis malorum or apple canker. This is a fungous attacking, as a rule, only trees which have been weakened from some cause. This cause has not yet been determined.

Mr. C. Bues, State Nursery Inspector was requested to visit the orchard in August and report on conditions. His report which is submitted, herewith, is to the effect that the underlying cause is lack of drainage and that the trouble can be remedied by tile draining a large part of the orchard. In pursuing the investigation Mr. L. P. Haskins, a soil expert, at my request made an examination of the sub-surface soils and reported as follows:

"I have taken samples of the soil and of the sub-soil from your orchard near Wausau and examined carefully the surrounding country for conditions adverse to good natural drainage. After examining the soil and sub-soil samples quite carefully keeping in mind the lay of the ground, I am of the opinion that sub-surface or tile draining is absolutely useless for your orchard. It seems to me you could not have more perfect drainage than you have there. I speak now of sub-surface drainage and I do not see how tiling could add to

it in the least. I have showed the soil samples to Prof. Whitsom and described the location as well as I could and he is of the same opinion concerning drainage."

Thus do doctors disagree! To show how great a diversity of opinion may exist one of our members who examined the trees stoutly maintains that the whole trouble is caused by improper pruning in the beginning leaving bad crotches in which ice collects etc.

While no solution has been reached of the problem the remedial measures suggested by Prof. Galloway such as removing the canker spots etc. will be applied next spring with the hope of checking the disease.

The net cost of the Wausau orchard during the past year is shown by the following report.

Expenses.

Rent	\$50 00
Labor	121 95
Material for spraying	23 50
Orchard disk	22 50
Pruning tools	1 50
Labels	3 00
Tree protectors.....	5 00
Trees	7 80
Expenses of Superintendent not including milage ..	35 12
Per diem G. J. Kellogg and A. J. Philips revising records	40 00
Expenses as above	40 91
 Total	 \$351 28

Receipts:

Gilman & Rick for cherries	\$12 18
Gilman & Rick apples and plums	100 00
 Total	 \$112 18

Balance or net cost	\$239 10
Cost for 1904	255 73
Cost for 1903	286 30

EAGLE RIVER.

Early in April a careful examination of this orchard by Mr. W. H. Adams showed a disastrous condition of affairs similar to that in 1904 viz., winter killing of practically all of the apple trees in the orchard and many of the plums. The orchard was replanted early in May, the planting season for this region, native plums being substituted in many cases for apples. In all 278 trees were planted; 206 apple and crab; 44 plum and cherry.

At the suggestion of several residents of Eagle River who believed that an elevated site on heavier soil would be more favorable 20 trees were planted on such a site on the farm of Mr. Adams. Under date of Jan. 19th 1906, Mr. Adams reports these trees all alive and in good condition.

Report of W. H. Adams.

F. Cranefield,
Madison, Wis.

Dear Sir: Am in rec't of your favor of the 18th, wanting me to report on the little trial orchard at our farm.

The trees are all alive, the bark is in perfect order, not a twig or a branch died. They made from 8-12 inches growth, the root growth was equally as great. They went into winter quarters with not a speck of fungous growth on their leaves. The bark is absolutely smooth.

The Wisconsin trial orchard here is in pretty hard shape. We had a snow storm about Oct. 19 and it broke the limbs and left them in bad shape. They should have proper care in the spring or the orchard will be practically lost.

The orchard made excellent growth this year and should have credit for it.

W. H. ADAMS.

The cultivation in the Eagle River orchard was continued as last year. We must keep on planting and hope for better things.

Finncial Statement.

Rent	\$25 00
Labor	135 00
Tree protectors	15 40
Trees	37 44
Expenses of superintendent except milage ..	6 50
<hr/>	
Total	\$219 34
Cost 1904	375 24
Cost 1903	236 21

POPLAR.

Of the 489 trees planted in the spring of 1904 all but 41 survived. These were reset last May and the second plat of five acres planted.

The trees made but a poor growth owing probably to excess of water in the soil and some fears may be entertained as to the outcome next spring.

The almost continuous rains during the growing season interfered seriously with cultivation and the growth of grass and weeds was allowed to remain as a cover crop. The work of converting the dumping grounds leased from the Northern Pacific R. R. into a park progresses slowly but surely.

That we are not alone in the effort to develop the fruit-growing industry of Northern Wisconsin is shown by letters received from Mr. A. B. Warner of Ashland and Mr. Knight of Bayfield. Mr. Warner who is secretary of the Keystone Lumber Co., of Ashland, has planted on land 13 miles south of Ashland, two trees each of 58 varieties of apples, 4 of crabs, 6 of plum, 5 of cherry, 1 of pear, 3 of peaches, and 1 of quince, making an experimental orchard second only in importance to our Poplar orchard.

While Mr. Warner's orchard is purely for pleasure and experiment Mr. Knight is entering the field of commercial orcharding and expects to plant next spring twenty acres of apples of nine varieties.

In a recent letter Mr. Knight says: "I have been observing apple trees grown here for the last thirty years and I am not afraid of failure of the hardy kinds."

Financial Statement.

Rent	\$75 00
Rent park sites	2 00
Labor	155 87
Trees and shrubs	132 44
Tree protectors	12 00
Fence material	7 58
Pruning tools	2 50
Expenses of superintendent	35 90
<hr/>	
Total	\$423 29
Cost in 1904	\$401 42

MEDFORD.

The Medford orchard suffered to the extent of 69 trees which were reset last spring. The orchard was found to be in excellent shape on my visit in May, due to the intelligent and painstaking efforts of Mr. Harris who spends his entire time in the orchard in spring and summer.

Financial Statement.

Trees	\$9 83
Pruning tools	2 00
Oats for cover crop	2 48
Expenses of superintendent	14 00
<hr/>	
Total	\$28 31
Cost 1904	\$83 20

In conclusion if I may offer suggestions as to the future of the trial orchard work it would be to repeat the thought expressed in the report as Secretary, viz., that no more trial orchards be established for several years, at least. The tried and tested regions of the state demand our attention. A portion of the remaining five acres at Poplar might with advantage be devoted to testing seedlings and new varieties whether from our own state or elsewhere. In addition if desired hundreds of thousands of seedlings might be grown here at slight expense to be distributed among our members for testing; after this if space remained, from one hundred

to one thousand root grafts of each of the different varieties now in our orchards might be planted with the object in view of furnishing our own home grown trees for filling vacancies in our orchards.

REPORT OF TRIAL ORCHARD COMMITTEE—ANNUAL INSPECTION.

S. H. MARSHALL.

Mr. President and Members of the State Horticultural Society:

Your committee made a partial report of their inspection of the trial orchards at the summer meeting, but will try and make a more extended one at this time. The orchard committee consists of Dr. Loope, Mr. Coe and myself, and in accordance with the rules of our society we inspected all of the trial orchards, during the last week in July.

At Eagle River where we made our first stop we found the orchard situated about a mile north-east of the town, consisting of five acres of nearly flat sandy land. The first trees were planted in 1901 and balance the next year. Of these original plantings a great part of the apple and cherry trees had been killed off during the hard winter of 1903 and 1904, but as a great many young native forest trees were killed at the same time we thought best to replant and try again. It would be hardly fair to say that it was impossible to raise apples in this part of the state without giving it a further trial. The trees were not root killed, but were killed at the top, the trunk being alive in many cases a foot or more above ground, or presumably up to the snow line. The young trees and those that had survived we found doing nicely as only 24 were dead and of these 14 were older trees that had been cut back in hopes that they would live. We found the orchard in a very fair state of cultivation considering the season. There did not seem to be any marked degree of difference in the hardiness of the various kinds of apples. We recommend that two more rows of cherries be planted the length of the orchard of the far side from town, to consist of 2-3 Early Richmond and 1-3 L. Montmorency.

Our next stop was at Wausau. The orchard here is about three miles north-east of town on high land and most of it well drained. The soil is a clay with numerous small stones in it. Here we were greatly alarmed over some disease that had played havoc with a number of trees and seemed to be spreading. This we decided was apple canker and our Secretary we found had sent a tree to Washington and they pronounce it that, and have given him some instructions as how to eradicate it and he is at work on it now. It is fortunate in one way that the disease should make its first pronounced appearance in a state orchard instead of a private one, as it gives us a chance to experiment with ways and means to stop it and give out the information we may gain to others who may be so unfortunate as to be afflicted in the future. We also found that the orchard was badly infested with scab, though Mr. Cranefield insists it was thoroughly sprayed. This may be accounted for by the weather conditions, thick fog most every morning until nine o'clock and lots of rain, or as I am inclined to think, some imperfection in applying the spray. Saw but two cases of blight. We found 73 dead trees and about 50 more or less damaged. A good part of this destruction was done by apple canker, but some of it was done by winter killing and too deep plowing close to the trees. A few of the cherries from being planted on swales were suffering from wet feet and we recommend that plums be planted instead of cherries in these places. We also recommend not to replant any trees in east row, but to let that row die out. We did not find as much fruit as we expected and what there was of it was so badly infected with apple scab that it was hard to judge of it at this time. The most promising varieties (as to fruit) were Hibernal, Pattens' Greening, Okabena, Milwaukee and Gideon. The plum crop was poor and the cherries were badly infested with shot hole fungus. From all we could discover the trees of the N. W. Greening seemed to suffer more from the canker than the others. Perhaps a fairer way to put it would be that the disease started with this variety and killed seven trees and then spread to the Longfield and killed six in two rows. Two rows of McMahan seem to be immune as only one appears to be affected. Next to these come two rows of Wealthy where we found about ten trees either dead or dying. The

Wealthy by the way goes not seem to do well in this location. Next to the Wealthy we find a row of reerless with only two dead trees, then comes a row of newer with one tree badly diseased. Two rows of nepka malenka sunered more with two dead trees in each row. These eleven rows seem to cover the damaged trees.

Our next stop was Medford where we found the orchard about two miles from town, in a good situation except for a ditch and some low ground in one corner. The soil is clay and somewhat similar to Wausau but heavier and more stony. This orchard consists of three acres and we found it in a most perfect state of cultivation. The trees looked thrifty except where the apple trees were affected by sun scald, caused by their being topped too high. There was only one dead tree in this orchard of three acres that could not be traced to wet feet. We recommend that these dead apple and cherry trees be replaced with plum. The first trees in this orchard were planted in 1902. They are too young to draw any conclusions as to the adaptability of the different varieties. The trees seem to have all made a fair growth, 13 dead in all.

Poplar is a small town on the N. P. Ry. between Superior and Ashland and about eighteen miles east of Superior. The orchard is just across the road from the station, which gives it a very public location. The orchard is fifteen acres and five acres were planted spring before last and five more last spring. The soil here is a very stiff clay and we have been unfortunate in having two extremely wet seasons. Last summer at the time of our visit they had hardly a day that they could get into the orchard to cultivate and the grass and weeds had a good start. Wherever there was the slightest depression in the ground there water stood and the trees were either dead or sickly and it looks as though we would have considerable replanting to do here, with 84 dead trees and more that look as though they would die before spring. The balance of the orchard showed a good growth for the trees that had been planted two years and only a scant growth for those set last spring. Nearly all the cherry trees were dead except one row that had a dead furrow plowed on each side of it and this emphasizes a lesson that was plainly shown at the other orchards. Cherries will not do at all well except where the soil is perfectly drained. We

recommend that in the future all cherries planted in this orchard have a dead furrow plowed on each side of the row and that some surface draining should be done at once.

REPORT OF TRIAL ORCHARD COMMITTEE—LOCATING ORCHARDS.

R. J. COE.

At a meeting of the executive board of this society held at Oshkosh during the summer meeting in August it was decided to locate two new trial orchards, both in the northern part of the state. One on or well toward the east side and the other over toward the west side, and the trial orchard committee was instructed to proceed to select these sites. Agreeable to these instructions your committee agreed upon a date and decided that we would inspect the eastern side first. Along in October we went to Oconto as a sort of headquarters and from there traveled by team and rail over quite a large tract of territory in Oconto and Marinette counties. Unfortunately we did not succeed in finding just what we thought would meet all the requirements. To the west and southwest of Peshtigo we found some splendid orchard sites but this particular section had been settled for a good many years and it is quite evident that it was settled by people who had grown apples in their former homes for nearly every farm had a good sized orchard and they were all located to the best advantage and they seemed to be in splendid condition. This section would undoubtedly be a good place for a trial orchard but as an object lesson it is not needed for the settlers have already demonstrated that it is a first class apple section. The other sections we visited did not seem to your committee to be just what should be selected. While we found some locations that seemed to be well suited to the purpose they were so out of the way that they would not be seen by enough people to make it worth the time and expense of establishing and maintaining an orchard in those localities. We thought that whenever a trial orchard was located it

should not only be a location favorable enough to make success fairly certain, but that it should be on a main traveled road where it could be seen by a good majority of the people of the vicinity. We had planned to visit one more locality on this afternoon of the last day. We felt that we could not spare the time but found we could not get a train that afternoon and it was too far to drive so we arranged with Dr. Loope for him to go the next morning to investigate that section, but he did not find conditions such that he thought we would be justified in locating an orchard in that section. Leaving Oconto at night the balance of the committee went across the state to see what could be found over on the west side. We thought Barron county would be about the right locality and decided to go there and if we could not find what we wanted there we would then look elsewhere. Mr. Marshall remembered a Professor Cheney (a former professor in the university whose health had failed) who had located at or near Barron and thinking that he might be of a good deal of help to us we headed for that place. We found our man and at the same time found what seemed to us to be an almost ideal place for a trial orchard, on his farm being a good clay soil gently rolling and situated on a main road just outside the thrifty growing village of Barron. Taken all in all I believe it is the opinion of your committee that this is one of the best if not the best site for a trial orchard we have thus far. While we did not locate the two orchards we set out to do (we felt that in an enterprise of this kind it was best to make haste slowly) we came home feeling pretty well satisfied with the results of our trip.

DISCUSSION.

Mr. Irving Smith: I don't know whether it is in order to discuss varieties or not at this time to put into the trial orchards, but I have noticed in the matter of cherries that none of the Russian varieties are ever mentioned. I would like to ask the question why some of the Russian varieties are not used in these experiments? There must be some reason for it.

Mr. W. J. Moyle: Perhaps the Russian cherries would be a great deal like the pears that have been sent out from that

wonderful country. The Russian pear is practically worthless, and a great many of the Russian cherries, as I remember them at the experiment station, were not hardy, a large majority of them, not even as hardy as our own best varieties. I think that is the reason they have not been experimented with.

Mr. D. E. Bingham: We have a few of the Russian cherries and they seem to be just as hardy as the Montmorency and just as nice a fruit and I would like to see some of them planted in the orchards.

The President: They have the names of the Russian varieties so badly mixed up that we often get four or five varieties under one name.

Mr. Smith: I do feel inclined to dispute what Mr. Moyle has said, because a great deal of the stuff that is sent out under the name of Russian is worthless, but still we keep buying of our nurserymen and we must have cherries. Now I think even Mr. Moyle will admit, if he will come up to our place in season, that there are some Russian cherries that are good in some locations. About twenty years ago, I don't know but it was more, we set out 75 Russian cherry trees. We bought them of a man in Oconto named Cook, who was an enthusiastic Russian cherry man and he grew them there. They came to us by the name of Oral and Ostheim. When they came into bearing, instead of two varieties there were three or four. The earliest ones were very bright red, and good quality sour cherries. Then comes another variety a little later, similar to that earliest one that is also very fine, most elegant quality when they are ripe and most disreputable when they are green. Then some that are quite dark, the kind, I should say that would be called a black cherry, although they are not black, but a very dark red. They have a little more of the astringent taste, but a very good market cherry. We have two of the dark ones, and in all the years that we have had those cherry trees we have never failed to get a fair crop and in most years a good full crop of cherries year after year. Some of those trees are dead now, but there have not any died for a number of years, except there was some very apparent reason for it.

Mr. M. S. Kellogg: I would like to ask a question along the line of Russian cherries and our native varieties, can Mr. Smith compare these cherries with the English Morello, Early Richmond or Montmorency and these classes that we all know, grown on the same ground and under the same conditions?

Mr. Smith: All I can say on that is, that we have set out for the last ten years, since I began to fill in where there were some dead, with the common cherries, and I have as yet failed to get enough to try, to compare with the others. Most of the trees are dead and those that are not dead look as though they wished they were,—never had any fruit on.

Mr. A. Brackett (Minneapolis): I cannot say in regard to cherries in this locality, but around Minneapolis and around Lake Minnetonka they have planted thousands of dollars worth of cherry trees, both Russian and our native cherries, and I do not think that a cherry tree is standing there today, and those that did bear a few just bore enough to supply the birds, they always get their share first anyhow. We have a composite cherry there, which is not really a cherry, but a cross between a cherry and a plum, and that is the only thing we get cherries from up there.

Mr. Moyle: In relation to these Russian cherries,—we tested those cherries thoroughly at our station at Madison. At least 75 per cent of those Russian varieties that we had did not blossom and bear a cherry. There was a variety there that I feel distinctly in love with; it was a dwarf growing tree, very hardy and productive and if I had a commercial orchard I would plant that variety. I wrote to Prof. Budd, asking if it was possible to get some of those cherries and he referred me to a party in the state of Nebraska, who he said was preparing scions, and I wrote to this man, and after a great deal of correspondence I got a lot of scions and grafted them, and I have found to my great regret that they are nothing in the world but the Old English Morello.

Mr. S. H. Marshall: Mr. Moyle says they have tried these trees in the station and they have not been successful. Well, I do not believe in condemning a fruit because it will not grow in one place; it should be tried on two or three other places. I do not think a trial of fruit in one particular location is worth anything; they may not do at all there, and they may do very well in other places. Now, I have plums in my orchard; right across the lake, within four miles of the University that do very well, that do not amount to anything on the other side of the lake, and vice versa. And I will answer Mr. Smith to say, as a member of the orchard committee for the last two years, that my objection to the Russian cherries was that I did not think they were as hardy as other varieties, and it has

been my experience on my own farm that they are very scant bearers. But I believe it is a good idea to plant some in some of our trial orchards.

Mr. Street: I noticed some of the plums died; were those Americana varieties, such as the Surprise, or Hammer?

The Secretary: Very few of the plums that died in any of our trial orchards, a very small percentage, some died in Eagle River, but we have planted many of the native varieties; we have not planted any Japanese or European plums in any of the orchards, with possibly an exceptional tree or two.

Mr. Street: Does the Surprise seem to be as hardy as the others?

Mr. Marshall: I think the Surprise is fully as hardy as any of the native plums.

Mr. Moyle: How about the Hammer?

Mr. Marshall: It seems that the Hammer is perfectly hardy; it is with me, I know, and bears lots of fruit, and the fruit, I think, next to the Surprise, is the best. The tree is very vigorous, and it almost comes up to the Surprise, it is one of the best things we have.

FRUIT MARKETING SESSION.

REPORT OF COMMITTEE ON CO-OPERATIVE FRUIT MARKETING.

W. H. HANCHETT.

As a member of the committee on co-operative fruit marketing I beg leave to report as follows:

Your committee as a whole have been unable to meet during the past year. As a member of it I have given the subject some thought, and as it has been my privilege to visit most of the fruit growing sections of Wisconsin, Minnesota, and Iowa, I have made inquiries regarding methods employed by the different associations I have come in contact with.

The following places that I have visited have associations: Eau Claire, La Crosse and Sparta, in Wisconsin; Long Lake and Excelsior in Minnesota; and Montrose, Iowa.

I found that methods varied greatly with different associations. The Sparta and Eau Claire associations seeking to look after the loading of the fruit only leaving the individual the greatest possible latitude as to how he was to pack his fruit and to whom he was to ship, while the Long Lake and Montrose associations practice some sort of grading and leave the marketing all to their manager, who is subject only to the board of directors; differing however in that while the Long Lake association aim to do their own wholesaling, avoiding the commission man as much as possible; while the Montrose association deal with the commission man solely. The question of commission man or no commission man seems to be a live topic wherever you find fruit growers.

The sentiment at Long Lake was decidedly against the commission man while at Montrose I found it just as decidedly in his favor.

Difference in location doubtless has a great influence in this matter. The community of fruit growers who have near markets are certainly not living up to their opportunities if they do not do their own wholesaling, while a community distant from its market making the refrigerator car a necessity must of a necessity look to the commission man as their distributor. The Long Lake association have amply proven that fruit growers through a well organized association may profitably do their own wholesaling; they having done during the past three years nearly \$200,000.00 worth of business at a cost of a little over 3% on gross sales, with something like \$600.00 of uncollected accounts on Jan. 1st, only \$100 of which was considered uncollectable. We wonder whether any commission house in the northwest can show a better record.

The Puyallup & Sumner association of Sumner, Washington, furnishes us with another example of enterprise and push on the part of an association. I found their blackberries last fall in every town in North Dakota in which the N. P. did business; shipped there by express in refrigerated crates, holding 72 quarts each.

Upon inquiry of a dealer at Valley City, I found these berries were often kept three or four days after their arrival in these crates in good condition. In a visit with Mr. Paulhamus, the

president of this association, I found he had visited all the leading centers of Minnesota, the Dakotas, and western Canada in search of markets for their fruit.

At Sparta no attempt has ever been made to place the entire marketing of the crop in the hands of a manager, our association only undertaking to look after the loading; leaving each individual to make his own bargain and ship to whom he pleased. I do not consider this the most business like way of doing but the great variety of soil about Sparta and the great variation in the quality of fruit make our growers very loth to pool their product, and a proper grading of the fruit would be the only way of making this possible. Secretary Cranefield has asked me in giving this report to give my opinion as to the benefits of an association and as to whether or not a still further benefit might be derived by a co-operation between competing shipping points. That there is a benefit to be derived from co-operative work no one can doubt who has ever visited a fruit center during the fruit harvest. In fact it becomes a necessity. The loading of one or more cars of fruit calls for systematic work on the part of some one, and this means co-operation either organized or unorganized, and in every instance where I have made inquiry I have found that organized co-operation has obtained the best average price. I was surprised on a visit to Rock Island and Moline, Ill., to find raspberry growers there getting discouraged and quitting the business because the prices in their local markets had ruled at 6 quarts for a quarter for several years, this too, when markets easily within their reach were paying fancy prices. A little co-operation here and some pint boxes to have shipped their product in, would certainly have paid handsome dividends. The advantages of leaving the marketing of the crop entirely in the hands of an association manager are that it leaves the fruit grower at liberty to give his whole time at this critical period to look after the harvesting of his crop and does away with unnecessary competition. That there may also be a benefit derived from co-operation between competing shipping points I also believe, for in this way only can a more even distribution be accomplished and competition be reduced to a minimum.

To illustrate: On June 14th, the past season, a leading La Crosse commission house was flooding the west with postal card quotations, reading as follows; Nice Fresh Home Grown Straw-

berries \$.75 to \$1.00 per 16qt. case. They are coming nice now and we do not think they will be any lower this season. On this same date Minneapolis buyers were paying \$1.60 per case on the streets of Sparta.

I have understood that this commission house is the manager of the La Crosse association. What must the members of that association be doing to allow their manager to be selling their product in job lots when buyers were paying \$.50 to \$.75 per case more in spot cash for car lots within 30 miles of them?

A talk with Sparta that day would have saved them some money.

DISCUSSION.

Mr. Hanchett: I regret very much that the chairman of this committee could not have been with us; I believe he was the one who inspired the appointment of this committee and he and I could not agree in all points as to co-operative marketing of fruit. Mr. Hotchkiss was very enthusiastic in the idea that if the fruit growers should combine and establish salesrooms in all of our large cities, take the business entirely out of the hands of the commission men, that we would derive great benefit therefrom. I do not agree with him in that idea. While I believe it is a good thing for the fruit grower to keep close watch on the commission man and know whether or not he is doing a straight business, I fully realize that if we were to undertake to oust our commission men, that we will have a fight on our hands, that there would be some loss in this fight that somebody has got to shoulder, and in all kinds of co-operative fights I always find that those who are the loudest in proclaiming the benefits of co-operation are usually the last ones who want to put up the money or who want to stand expenses of any kind of a fight or any kind of a loss, and I do not think it is advisable or safe to undertake to suddenly upset any established methods of marketing. I believe that there are commission men who are just as honest and conscientious in the performance of their work as the average fruit grower, and for my part I feel that whatever is done in the way of co-operative marketing should be done in co-operation with reliable commission houses, as well as through co-operation on the part of fruit growers themselves.

Mr. Brackett: I would like to say one word in regard to this co-operation in selling fruit. I live at Excelsior, near Lake Minnetonka. We have an association there which we started without thirty members five years ago, and now we have about 145 members in the association. We ship nearly all our fruit through the association. Of course there are a few members there that ship their stuff to the commission houses, and I think it is very necessary that we have commission houses. There are times that we have more fruit than we can possibly dispose of through our regular channel of shipping to our customers through the association, and on such days as that it is necessary, we have to do it, we have to consign our fruit to the commission houses, and as this gentleman said, his paper was very thorough, he covered almost every point. There is one point he did not hit upon. We find in shipping fruits through the express companies that very often we have lost shipments,—may not have been delivered, may have been sent on the wrong road, and it is the fault of the express companies in doing so, but it is very hard to get anything out of the express companies if we have to go to them as an individual, it is a very hard job to do it, but through the manager of the association who is shipping all this fruit, when he goes to an express company for damages which he can prove, he does not have any trouble in getting repaid. We have had two instances of that kind at Excelsior. One time there was a lot of fruit sent through Minneapolis from our town, and through the neglect of the express company they allowed that fruit to lie twelve hours in Minneapolis before it went on. It caused us a damage of at least \$100. All our manager had to do was to present that to the express company, and without any delay they refunded the \$100, when, if it had been an individual, we might have fought them for a year and probably never would have got it.

MARKETING FRUIT.

A. L. HATCH, Sturgeon Bay, Wis.

There is a general impression that to keep well, fruit should be picked before it is fully matured. It is true that dead ripe fruit does not market well and soft fruit is at a discount in all markets. It is also true that some fruits like strawberries will color up and become apparently ripe in two days or less. With some fruits, notably the apple and peach, my observation and experience is that they keep best if fully grown and well colored when picked. Not only this but green fruit will never become of good quality and is often extremely poor. If you do not believe this try it on your Wealthy apples. No fruit can mature unless the tree or plant upon which it grows has good healthy foliage the entire growing season. Hence one necessity for spraying.

Another essential in marketing fruit is to prevent bruising. This means careful handling and transporting from the first to the last of the life of the fruit. It means taking the fruit directly from the plant or tree to the package in which it goes to market with the least possible handling. In apples I have already sorted as I picked and packed at once in the orchard. Of course I continue sorting all fruit as long as it is in sight, always throwing out imperfect fruits until the package is ready to cover.

In packages I have used barrels, bushel baskets and boxes for apples. For home market where packages can be returned bushel boxes are convenient and best, but for shipment I prefer barrels. For plums I know of nothing better than climax one-fifth bushel baskets with side slatted raised cover with slats set somewhat closer than for peaches. For cherries, blackberries, strawberries, gooseberries and currants I prefer the 16 quart Hallock crate with wooden boxes. For raspberries I use 24 pint Hallock crates.

Various kinds of paper boxes are now being exploited but I have seen more worthy of recommendation. Most of them are too flimsy and faulty in principle. A trial of one of these in shipment gave very poor results. There are now two firms in Wisconsin making birch veneer boxes that give excellent satis-

faction and we find them much stronger than white wood which was the original box material in Michigan and since its exhaustion there is obtained in Tennessee.

Where the quantity of fruit is greater than what is needed at home it is often necessary to combine with neighbors and load cars together in order to secure proper transportation and marketing. Where refrigeration and marketing is necessary as in the case of all berries and summer fruits it will be necessary to hire some one to receive, load and forward as well as to see to icing and fixing the cars. With us this person has acted as our salesman.

Of course where it can be done sales are made on the track but this can not always be done and then the salesman consigns to whoever he thinks best.

Where shipments are made over through routes between our great cities I think it would be a decided advantage to secure a private refrigerator car service as then better and cleaner cars can be had and expert inspection and care is given that will often be of great value to the shipper. If enough business is done to warrant the expense then it is advisable to have a man at the market end of the route to hustle for the shipper's interest.

(Where reasonable contracts can be made with reliable grocers and merchants and where deliveries can be made with reasonable certainty that method of marketing is usually satisfactory. But whatever method of marketing is adopted the shipper and grower should have telephone connection with their markets and have full information about their market at the latest possible moment before every shipment.)

DISCUSSION.

Mr. Geo. E. Rowe: This subject of marketing of fruit is so very large, and the phases of it that are of special interest, or that concern different states and different sections vary so greatly that I hardly knew which phases of it would be best to take up in connection with your meeting here.

I find in general that there are three things that enter into the marketing of fruit,—the man, the fruit and the market. Good man, good fruit, good market; poor man, poor fruit,

poor market, in general. The rule will not always follow out, but that is generally true.

My first experience in marketing dates back thirty-five years, when a boy, nine years of age, I used to go to market every day during the summer and hold the horses while my older brother went from house to house and hotel to hotel and took orders and delivered the goods, over at Grand Rapids. By-the-way, he was the first one to grow celery and sell celery in the state of Michigan, and think of the great industry that has developed since that time. I do not remember just when he began to sell it, before I had to hold the horses, I think. From that time until the time I was ten the next year when he went away, I had all of our goods to sell. We were among the first growers around the city, and that was the peddling of fruit from house to house, the grocery stores at that time did not handle green goods, they handled simply the old staples, but I think when I was about fourteen they had begun, a few of them, to handle strawberries and peaches and other classes of fruit. Then we found it would be easier to market a load by going directly to them and selling and taking the cash. My father with two other gentlemen, W. N. Cook and S. N. Pearsall were sent to the tri-state fair at St. Louis to represent the state of Michigan with a large collection of fruit. We having lived close to Grand Rapids market, always having had a good market and good prices, the fruit industry looked like a very fine thing.

At the tri-state fair at St. Louis we came in touch with the Iron Mountain Railroad people, and men representing the line of industry in Arkansas. They had lots of nice fruit there, and cheap land for sale and great inducements to offer, and father, with some others, thought it was a fine thing, and so in the course of a very short time we found ourselves in Arkansas, at the foot of the Ozark mountains, with a fruit farm, expecting of course the same good prices and the same good treatment from those to whom we sold our goods as we had in our home city, when we met the man to whom we sold face to face. But after we were established we found a very pleasant gentleman coming every day or two from the north or from Chicago and from St. Louis and from Kansas City, and all of them leaving their stencils and telling us and assuring us that they could give us the very best prices obtain-

able on the market for our goods. We planted heavily and we shipped heavily, and sometimes we got pay for our packages and sometimes we did not, and after a couple of years the bank account began to lessen that we had saved up and stored in the old home city, and it began to be another proposition. We attempted then, and did, organize a fruit growers' association. This proposition we came up against in our returns from the market, "Soft and sandy;" "berries arrived too late," "market glutted," and that of sort of thing constantly coming up, regardless of the condition and the time in which the goods were shipped. So then we came to the conclusion, after we organized the fruit growers' association, that in some places the express companies were perhaps to blame, because there were three express companies running over the same line, and all fighting for the business, and each express company could get into the market quickest. For example, getting into Des Moines, Iowa, or Cedar Rapids, every one could get there the quickest, and some of them would take 24 hours longer the way they went around, and so in those cases the express companies were to blame. But we found that the express companies and the commission men and the glutting of the markets, those three things, and the fruit growers said, now, we will have to investigate and find out, so as to know what markets will take our fruit. I happened to be the one that was elected secretary, and put on the road, and in 1886 I spent a day here in Madison, looking up your market to find out just what your capacity was. I visited many places, the size of Madison at that time, the largest cities in the Northwest, I visited in behalf of the fruit growers and shippers' association for the purpose of finding out what express company got in there first, for the purpose of finding out what commission man in that place was doing a square business, for the purpose of finding out how much goods the market would take, so that we could keep from overstocking the markets and could regulate our system of shipping so as not to get more berries in here than you could take, because, if they were good berries and you had five times as much as you could use you could not give anything for them; if they were good berries and you had the right amount, you could give a good price for them. Those three things we worked out along this line.

Each day all findings were printed and sent to every member of the Association, and those men did not get any more goods from that section, and they never knew why. They went down, they sent their men down, and they wanted goods and they never got them until they paid the cash for them.

I found the same sort of thing in Chicago. I found the same thing in every city where commission men are doing business. I found on the other hand again, that the express companies were to blame in some cases, and by-the-way, the express companies, when we appealed to them, told them what we had in mind, what we wanted of them, dealt fairly with us. The Superintendent of the United States Express Company at that time in St. Louis, said, "Mr. Rowe, we will do everything for you we can."

He gave me a letter of introduction, did not tell my business, but gave me a letter of introduction to any agent of their company, saying anything they could do for me would be appreciated by him, and gave me access to the express company's books. He gave me, on the other hand, transportation, an annual pass on any line that the express company ran on, or had any interest in, and the Pacific, United States and Southern, they all did the same thing, so that the matter of transportation and the matter of getting at the books so as to know just where the trouble was, was provided for by the express companies. They said, "This interest down here is our interest as well as it is yours, and we are willing to bear our part of the burden, to get at the best markets, and to find out what the trouble is," and in every case, where we made a report and a statement showing where goods had been delayed, and where the express company had been to blame for the delay, they paid the damage without any quibble about it at all. It was to their interest to do it. They were getting at that time through that fruit section, as long ago as that, they were getting 25 to 30 carloads of strawberries a day through that fruit belt.

I found, further, that the fruit growers were to blame in a great many cases. First of all, fruit growers, as a class,—I am now speaking of no particular organization, it is true of Michigan, it is true of every state in the Union, fruit growers, as a class, do not grade their fruit close enough, they are altogether too careless in the putting up of their goods, and

the commission men get a lot of goods on their hands that it is hard work for them to get expenses out of it, and they have got to make it up somewhere else; they have got to even things up. The fruit growers, as a class, do that sort of thing. I know of some of the very best growers whose goods in many cases are in a deplorable condition, even though they were fresh, when we go down further in the box. So that I recognize a lack of grading, poor sorting and poor grading of fruit has a whole lot to do with tempting or forcing or inducing the commission men to do the many things that he does. But because one man does wrong, that does not justify another.

But, I have found altogether, that the fruit growers are the hardest class of people to organize and hold together in any organization. While we organized and while every man through that section was benefited by its results, out of the over a thousand growers that were on that list, you could not get 100 of them that would put up \$5 apiece annually to bear the expense of getting the markets. They would not put up the money, they would not furnish a fund so that a man could be kept on the road, and so that the work could be organized and carried out; we found that out to be a familiar fact. Anyway, the disappointing conditions on account of the long distance to market and the inability to get the best returns from the commission men, induced us to sell our estate before everything was gone, and came back again to Michigan. After a few years I purchased an estate there and decided that it was absolutely necessary, in my own mind, to be in a position to have the buyer come to you, rather than you go to the buyer, and so we organized a Grand Rapids Fruit Growers' Association, composed of something over 500 members. We advertised. We sent out literature to 10 000, 15,000 and 20,000 dealers all over the country, with a picture of our market, and about what goods we had, and about when they would be ready. They would begin firing in letters, saying, "Ship the goods." We say, "We do not ship anything; we have the best in the world, you have got to come and get them. So, the first year we had 25 to 30 outside buyers, stayed there all the time, bought and shipped to their markets. Now, we have 100, sometimes 125 stop at the hotels at Grand Rapids, staying right there or arranging with some-

body to buy and ship to them, and we have found that that is the most satisfactory way of doing business. The Fruit Growers' Association at Grand Rapids does not do a single thing about growing or packing or co-operation or anything further than simply to advertise the market and get the buyers there. And they have Mr. Fisher, from Columbus, Ohio, who has bought on our market for two or three years, and he used to send two or three carloads a day, and he knows Mr. Jones and Mr. Harris and all those men that are lined up on the road, he knows what kind of goods they have got, and if you do not put up the right kind of goods, they do not sell them, and people soon find why their neighbors next to them can get \$1.25 for his peaches and they do not get 25 cents. "How do you account for his getting so much more?" "Well, they are the same size all the way through." "Well, I wonder if that does make it." Why, you could not induce him any other way to do better, except he saw the other fellow get the cash.

We have now, without any question at all, the largest wholesale market in the world, having sold from our market more than from any other single point; the Michigan Central has run out in one day as high as 175 to 200 carloads a day, and those goods are bought by outside people.

I know there are some good commission men, can't help but be, in so large an industry. I realize on one side they are hampered by poor stuff; they are bothered again because the growers do not know the quantity the market will contain, and the market is often glutted, and the express companies sometimes are slow, and they have their troubles, and they have their tales of woe, there is no question about it, but when a man does give them good, clean, honest straight goods, they are afraid to return it all to him, for fear they won't get a chance to get even again; they are just afraid to do it; they do not mean to be dishonest at all. I understand over in Milwaukee there are some pretty straight, clean commission men; I don't know just what their names are, but one of the oldest men in the country, S. M. Pearsall, years ago used to send everything he grew in the shape of apples to Milwaukee and he said he went over there and he found a man there that was absolutely honest and returned him every penny for his goods.

We have another friend who is shipping all his goods, pretty

high grade goods, to Milwaukee. He has been over a number of times, knows where they go, and he gets a pretty good price for his goods. I think that he last year got \$4 a barrel for his apples, the year before \$6 from the same man, this year he is getting better than \$6, I understand, from the same man, for a large quantity of apples, but those apples are absolutely perfect, there are no worms in them, no blemish, absolutely perfect, and, of course, a commission man getting an absolutely perfect thing and a large quantity of them, he has to be pretty nearly square with that man.

So there are the problems that enter into this matter of marketing, from one end to the other, south to north, I have come to realize that they have got to be solved with each individual locality. A bunch of men that are gathered together, with good goods and a good man back of them, will command a good price in almost any market.

Mr. Goodman: I would like to say a little on the matter of co-operation and the marketing of fruit in packages that applies to Missouri, and I think it ought to apply to you people here just as much as it does to us. As friend Rowe said here, each locality must settle this matter for itself, and as Mr. Hanchett has said in his report in regard to the co-operative association, I find the same things occur in all parts of Missouri. We have quite a number, some fourteen or fifteen different co-operative associations down in Missouri, and some of them are carried on successfully and make good reports and get good returns and some of them are failures.

The main requisite in co-operative matters is to have, above all things, a good man at the head of the association, a man who will have the confidence of the fruit growers. As has been suggested, it is one of the hardest things to do, to get the fruit growers in one community—not in a large community like Grand Rapids, because they can be collected easier, but in smaller communities it is a hard thing to get the fruit growers to combine and to stand by what they promise to do when they begin, but if you do get them to agree to a thing, and stick to it, and then get a good man to handle that thing, he will always, without a single exception, he will always secure better results, better prices and get the things into the market better than any individual can under any circumstances. That is my opinion and that has been so all through our Missouri district.

We have gone another step farther now in the matter of co-operation, and have organized an association which will combine all these local associations. For instance, we have fourteen of the different local organizations, the different shipping associations combined together. Now, then, it is a mistake for this town and a town ten miles away and a town twenty or forty miles away all to ship a carload of strawberries to Minneapolis, or two carloads each. But this general organization is to keep track of the markets, and if they can find different markets for goods, to send one carload or two carloads to one place and another carload to another place, and so we find the matter of co-operation a very important matter in marketing our fruits to advantage.

A few years ago I thought that in Southern Missouri, in the Ozark regions, we would have to give up growing peaches and strawberries, because of the failure to secure markets, but since we have had these organizations we find that we have very little trouble if we have the right kind of a man to take hold of the business, one that will take all the shipment from a certain locality and handle them, we find we can get good returns, and, as has been suggested, you can always get the ear of the railroad company, and always get the ear of the expressmen and get the ear of the commission men.

I want to say in regard to these commission men, that we have tested them and tried them in our co-operative matter for many years and we do find commission men in certain towns that are good, straight men and give us good returns, and we have two plans now of handling our fruit, and that has come about as the result of this co-operation. I am glad to know that Grand Rapids has taken that stand, that they will still have their stuff and have it for sale and sell it on the track and let people come and buy it. We have one or two or three locations in Missouri where we can do the same, but for the general public we find it is pretty hard to insist on that thing. We have in our plant ourselves let a whole carload go to waste on the tracks after it is packed and ready to ship, absolutely, because we could not get a buyer to take it, and we refused to ship it to any of the commission men that we have, and it was the cheapest way to lose it, too, but it brought the commission men down to this point now, so that we are sure to sell. We have buyers from Minneapolis and St. Paul down there, two or

three men that are buying all the time during the whole of the season, from the time strawberries begin running, and they are there through the peach season, and they listen to us now; when we have hundreds of car loads to ship it is something of an object to get them. Yet we do in certain instances have men in several of our larger cities and we will ship to them directly and they will take care of our shipments every time and they will give us about as good returns as will the buyers that come down and buy at our place, but these are exceptional cases. We have men in Denver, Omaha, Council Bluffs, St. Paul and Minneapolis and scattered through the North and West, and we ship to one man in that point and to one man only, and if we are sending to one commission man in that town, we will not sell to another commission man from that town either, and that protects our commission man and he will take care of us every time and no man can buy from us a carload of berries if we are sending that same day a carload of berries to a commission man who has handled our berries for six or seven years. It has come down to these points,—a good man at the head for handling it, good fruit, which we insist shall be graded, not like friend Rowe says, they are better organized up there in that regard, but we have here berries and peaches as they come in they are inspected and marked, and the inspector or handler of that business marks each grade "A," "Grade B," or "Grade C," and it has to go that way. If I bring in some fruit marked "Grade A," and he inspects it and finds it "Grade C," it goes out as "Grade C," and there is no appeal from it.

METHODS OF MARKETING FRUIT IN CALIFORNIA.

AUSTIN WALLINE, Upland, Cal.

The small amount of California fruit which first entered eastern markets had no competition with outside fruit, but as the industry developed, our fruit came into direct competition with Florida and foreign fruits. This required the overhauling of our market methods to meet these changed conditions.

Then, as now, the most serious problem which confronted the California grower was the question of freight. It required large sums of money to place our fruit on the eastern market.

As is usually the case, the fruit grower first tried the system of marketing through the commission man. While I do not wish to criticise the commission merchant, still his system of handling our fruit was not satisfactory. When prices on oranges were high, the commission firm boomed the orange market and everything moved along smoothly, on both the auction and f. o. b. basis; but the minute the orange market took a slump, these firms would boom some other commodity and either refuse to handle our fruit, or else sell at a loss to the shipper. This was no doubt very good business policy for the commission man, but rather unprofitable for the shipper. Since it is to the dealers' interest to rush fruit to the strong markets, it was no uncommon thing to have such a market quickly over-stocked, with the natural result—a slump in prices. Then was the time the commission man turned his back on the shipper. Since he did not own the fruit, he would not be held responsible, and generally left the shipper to suffer the losses due to the over-stocked market. The fruit industry was, to use a common expression, "All up in the air."

There was no general system of packing; everyone had his own system. A special brand did not stand for any particular grade of fruit. If the fruit was sold for cash on the trees, and the markets did not suit the buyer, it was usually allowed to decay without being paid for. If he sold (f. o. b.) free on board the cars at the highest eastern price, and the market meanwhile took a slump, the fruit would probably be rejected on pretense of being of inferior grade. If he sold at auction, he depended entirely on the tender mercies of the buyer and middleman, who could return money, or red ink. This was the condition of citrus marketing up to 1893.

In the month of August of this year a few prominent growers met in Los Angeles and organized themselves into the Southern California Fruit Growers' Exchange. The fruit exchange is organized as follows. In the first place there are the local packing houses. These are situated in convenient localities throughout the citrus belt. Associated with each one of these is a local exchange composed of the individual

growers of that community, controlled by a board of directors, elected from their own number. All these growers bring their fruit to the exchange packing house, where it is sorted, packed, and shipped. Each of these local exchanges belong to what is known as the district exchange. There are four or five of these local organizations in each district exchange. In the same way, thirteen district exchanges unite to form the central exchange, which has general control of the entire system. The district exchange has a manager and a board of directors, elected from the several local organizations, while the central is organized in the same way from the district exchanges. The principle underlying this system is that "Every member is entitled to furnish his pro rata of the fruit for shipment through his association, and every association to its pro rata of the various markets of the country. This principle reduced to actual practice gives every grower his fair share and the average price of all the markets throughout the year."

The business end of the proposition is as follows: There is the head office in Los Angeles and seventy-five branch offices scattered through the United States, Canada and Europe, through which orders are obtained for fruit, and through which offices delivery is made to the purchaser. Any adjustment for decay or poor quality being made by the local agents on the ground in the markets in which the fruit is sold. The matter of price is at all times controlled by the central office at Los Angeles. The preparing of fruit for the market and sale is controlled by the various exchanges and done at actual cost, which is determined at the end of the season. The money received for fruit is paid directly to the organization which furnishes the same. The funds to meet expenses are obtained by assessment from the various organizations, the basis for assessment being the number of boxes shipped.

During the first two years of its existence, the exchange marketed its fruit largely on the f. o. b. system. But they were soon taught that this could not survive, as in a single year \$100,000 worth of fruit was rejected or lost in the eastern market, in the manner I have already mentioned. On this account the system has changed to that of "selling delivered." In "selling delivered" the exchange establishes its own agencies at all principal points of distribution. The fruit is sent to them direct and sold on the spot for the highest

market price. The advantages of this system are many: (1) it allows the selling for the highest market price; (2) cars can be re-routed on the way east, which removes the chances of a glut in one market at the expense of another, since a car can be diverted from its original destination and sent to another city; (3) the fruit is sold to the buyer on inspection, which guarantees satisfaction, since both parties are present and adjustment can be made; (4) the constant development of new markets and better distribution of the produce. Since the eastern agents specialize in citrus fruits, it is to their interests to enter new fields, boom the fruit, and bring about the largest possible area of distribution.

What has been the benefit of this exchange system to the grower? It takes off his hands the responsibility of selling, packing, and shipping, with the result that the cost of marketing has been reduced from sixty-five cents per box, to less than thirty-five cents. This is made possible by having the smaller packing houses combined in one larger one. The packing supplies are bought in lump lots for the whole system. In the second place the grower is protected, in a large measure, against the transportation companies from losses either in wreck or through negligence in caring for the car during transit. Since 1893, with the exception of one year when our fruit was not first quality, we have received prices which made orange growing profitable to the ordinary rancher, which is more than can be said of the period before that time.

The exchange last year sold for the growers about 48 per cent of the entire crop of oranges and lemons, or about 14,000 carloads of fruit. The remainder of the crop was marketed by independent packers and commission men. While some growers are able to do better by selling for themselves, yet in general it is safe to say that the orange industry owes its strong foundation to the exchange system, since it not only takes care of the growers who belong to the exchange, but it compels the cash buyer, who still remains in the field, to pay a price equal to that which exchange growers receive.

While the plan which I have outlined applies more especially to oranges and lemons, still it is gradually spreading out so as to include co-operative marketing of other produce, such as apples, small fruits, celery and potatoes. The development of the Hood River Valley in Oregon owes its great success largely

to the co-operative exchange system of marketing. In handling their strawberry crop, there was \$30,000 more net profit to the grower last year than ever before. Ninety per cent of the apple crop is sold through one central agency, which sees to the grading and marketing of the fruit. The Hood River Valley is only one of the numerous instances which could be mentioned where successful exchange marketing has been practiced.

Unfortunately I was not present to hear the discussion upon this question of Co-operative Fruit Marketing as presented earlier in the program, among the fruit growers of this state. However, it seems to me that there is here in Wisconsin a field for such a system. Large sections which are engaged in the growing of small fruits or vegetables should be organized into co-operative districts. Have the produce graded and of even pack. Have each member bring his produce up to a required grade. By selling produce of a high grade from any district, that section will soon develop a special market, which will offer a fancy price. Each district can have its own agent, who will bring the special brand under which the fruit of that community is marketed, and only that brand, before the public for sale. Co-operation pays and we are in the business for the dollars and cents we can get out of it, so why not co-operate?

MARKETING FRUIT.

(Prepared by James Handly, Quincy, Ill., but not delivered at Convention.)

The subject assigned to me is far reaching, disclosing greater depths than it would be possible to fathom in one discourse, and ranging in unlimited fields that could not be encompassed in all bearings in a short address. In my immediate vicinity in Illinois, there seem to be no special organization among fruit growers for the purpose of directing best methods of marketing. Each fruit grower has an independent way of thinking and acting, striving to reach the best results from following his theories. I have been something more than a casual

observer, however, on the systems of marketing fruit in regions quite beyond the boundaries of my own neighborhood. In an effort to get the best practical ideas of fruit growers who have scored a commendable success in marketing products, I recently wrote to several engaged in the business, and I beg leave to submit some of their replies:

P. E. Goodrich, of Cobden, Ill., says: "In reply to yours of January 16, asking for information relative to the marketing of fruit, permit me to say, that in my own town we have a regularly incorporated shipping association, whose manager's business is to make contracts with railroad, and to secure the number and kind of cars required by shippers. If in winter, for shipping sweet potatoes, first, the cars required in a daily supply are placed on side tracks ready to receive the barrels. If in summer, and ice cars are needed, he procures them, and has them charged with ice, ready for use.

The manager collects information as to markets and prices, receives fruit at the cars, receipting to the owner for the same, assists in the placing of fruit properly in the car, makes a manifest for each owner, and builds a car consigning it to the proper person at its destination. We get the best rates and service in this way, because the cars are shipped from one person to one person, and this relieves the railroad of all clerical work, and the labor of loading and unloading the cars.

The freight is collected by the manager at place of consignment from a shipper's commission house, receiving it, and paid to the railroad in one amount, as per the whole number of cars received on one date, thus relieving the railroad of the trouble and expense of collection. Our association now ships, during the fruit season, from fifteen to twenty cars daily, which amounts to many thousands of packages; thus it will be readily seen that a very competent and systematic plan of shipping is absolutely necessary."

E. H. Shepard, Manager of the Hood River Apple Growers' Union, at Hood River, Ore., under date of January 26, writes to me as follows: "I regret to say that I have nothing to offer in the way of a printed circular along lines of information you seek. We attribute our success largely to association work. In the first place, in order to get the best results, I believe that selling f. o. b. is one of the necessities, but in order to sell this way, he must control the situation. To do this, you must or-

ganize an association; having done this, it is also necessary to bind your growers to market their fruit with the association, and this must be done by a regular contract signed by each grower; having done this, the next step is to educate your people to grow good fruit, and certainly to insist that they furnish first class fruit, leaving out culs. This is really the gist of the whole matter, and in these few sentences I have covered what might be elaborated upon to the extent of several pages. You know what is good fruit probably a good deal better than I can tell you; see that they put it up right, and this covers the whole subject."

J. Fowler of Upper Alton, Ill., who was an eminently successful orchardist and apple packer in Calhoun Co., Ill., for twenty years, gives the following observations: "Referring to the matter of marketing fruit, perhaps you are already in possession of better information and data than I could suggest. I have tried to find out how to get the best market results in various ways; have consigned to various commission houses, and this method cost me thousands of dollars, owing to short returns; have sold to be paid for on arrival, and this is bad, as the average dealer or commission house will turn your car of fruit down on the arrival, providing the market was a little off, and wire that the car has arrived, fruit not of condition and subject to your order, and turn the rejected car to some other house, and of course, it has a good excuse for slaughtering this rejected car of fruit, and then we might be called upon to pay freight and other incidental expenses. Now I have had some good success in consigning fruit, but it is not the rule. The grower that consigns the fruit, that is, as a rule, holds the bag all the time. He takes all the risk and worry, and cost and growing, picking, packing and shipping, and the great risk and worry over what the commission house will return to him; and if anybody gets hurt in the deal, it is the producer or shipper. The most satisfactory way for the producer is to sell at home, either in bulk, in orchard, or by the barrel, packed and settled for on the spot the producer should sell an honest barrel of apples, and then pack an honest barrel of apples. I could say more or less about the system of packing and grading fruit that does not exist in the practical work of many growers, and this is somewhat against them. There are lots of growers who refuse to pack an honest barrel of apples, as well as a lot of com-

mission houses who refuse to make an honest return of sales. Erb of Memphis says that he is a grower as well as a commission merchant, and he favors consigning, but his suggestion falls very flat with us, because Erb is in the commission business. Buy and sell apples, and let each one take his own risk for results. Much could be said about producers reading up, and being posted on general conditions, so that they can sell their fruit intelligently, and get what it is worth."

The following extract is from a letter received from Major C. C. Bell, secretary of the Central Missouri Horticultural Association, and who is well known as a national figure in the horticultural work in its various departments: "Referring to marketing fruit, will say, that I can only look at the business as a whole, and suggest ways which from my personal experience is for the betterment of the business, and which I will look upon in a way far different from a contracted point of view. I want better quality, more careful assorting and handling and honest packing. When this is done, in fact, and not in words, then a paying price will always follow.

I am, and always have been a great believer of specialties, and I think if this is followed in the fruit business, those engaged in it will make more money. Perhaps the first important question in varieties of fruit is to consider the location of the land, its quality and position for market. Strawberries may pay big on land worth 100 dollars, or more per acre in some good position for market, while they would be a failure on the same sort of land only costing 10 dollars per acre; not well located to a market; this holds good for all fruits, but more especially for the most perishable fruit.

As stated, I believe in specialties, and hence, think that the grower should not try to be a dealer, speculator, as in the long run, such methods would cause him to lose money. The nature of all business requires that it should be well done, with experience, capital and tact of application; and we can only be a link in the chain of commerce, and never the whole chain. To be a jack of all trades at this time and age, as a rule, is failure; and what we want is success.

To be truly successful we must be broad and big in our views, and this is especially true in business, and on this point every farmer has much to learn yet. To illustrate, I call to mind an apple grower living in my neighborhood, who had a very

fair crop of apples, attracting many buyers, and who, on account of both quantity and quality, had run their offers up high, and to the point where no margin for profit was left; and yet this apple grower in the face of the market, and not sell, but held out for higher terms, dragging along until the buyers withdrew, as some of his varieties are ripe and ready to go into cold storage when they should have been in shape with barrels on the ground to pack. The result was, he was left with a lot of apples, some too ripe for good packing without a buyer; he had to undertake to pack and ship for himself, and by the time he secured barrels and packed with farm hands, and loaded on cars, he then tried to sell to buyers, but the best of buyers did not care to take them in that shape, and so days, and I am informed weeks, passed in this delay, and I was creditably informed that he did not get one half as much in the end as he would have had for the apples while they were on trees. My advice, therefore, has always been to both growers and speculators to sell whenever you have margin and do not begrudge a little profit the one who buys may make."

C. M. Gerard, Secretary of the Eastern Illinois Fruit Growers association, writes to me from Charleston, Ill. as follows: "The object of our association is to prevent each grower from going to our local retail dealers, and allowing him to establish a price by quoting something that came to him by hearsay in regard to the price of fruit. Secondly, to keep in touch with the shipping trade, and thus prevent a surplus of fruit at home. Our members received the same price for the same grade of fruit, and by selling under our direction they received an advance of 25 per cent above the prevailing wholesale rates. Our object is, to include all kinds of fruit when the fruit growers are willing to bear a pro rata expense of a salesman, both local and traveling, when necessary to dispose of fruit to the best advantage. We are perfectly satisfied with the success of our association thus far."

G. A. Atwood, of Springfield, Mo., secretary of the Ozark Fruit Growers' Association, says in a letter that was a little delayed:

Please excuse delay in replying to your favor of last month. I have been and am exceedingly busy. Have been to several

of the northern markets as far as St. Paul, and the office work here is getting to be large. The objects and aims of the Ozark Fruit Growers' Association are partially set forth in a circular I send in another envelope, the only copy I have left. We shipped 525 cars of strawberries last season from central headquarters, Fayetteville, Ark., and later at Monett, Mo. We made more money for these local unions than some of them ever made before. Expect to do a larger and more successful business the coming season. The system is simple, safe and inexpensive.

Manager and secretary have modest salaries. We have agents in the principal markets during our shipping season. A large proportion of cars are sold on track. We expect to sell 1000 cars of peaches this season if there is a fair crop. With telegraph and long distance phone the manager at central office can dispose of cars just as readily as if the cars were before him and buyer.

Without some system in marketing berries and peaches, these berries and peaches would not pay expenses. And we shall have to use system in marketing apples.

Before the recent cold spell we had the fruit buds for 1,100 or 1,200 cars of berries, 2,500 cars of peaches and 8,000 cars of apples. Peaches have been badly killed in some sections. Between Springfield and Koshkonong there are enough live buds for a full crop.

Success to you in co-operation.

Not wishing to come before an intelligent body of growers and shippers with finely spun theories, I have availed myself of the opportunity of presenting views, and also giving experiences of some of the most practical fruit growers and packers selected from a widely extended acquaintance. At the present meeting, as well as in many others held to discuss practical points along horticultural lines, we repeat ourselves, and repeat remarks frequently made by others. Perhaps it is quite proper that this should be so, as it causes a continuous stirring of soil, which may need a continuous repetition in sowing some of the best seeds of thought which may require constant application before they take root, and are finally in shape to produce satisfactory results. In order to market fruit successfully, I would require the man entering upon the business as a grower that he should be interested in his work

to the extent that his vocation would always be an inspiration; he also should be eminently fitted for carrying on his work successfully. It is a sad fact that too many of the failures in life are frequently caused by men widely missing their calling. We have some farmers who would make good statesmen, and would be capable of shining in many professions. We also have many preachers who would be rendering better service to the world if they followed a plough or managed a commission house, and who would try to place bounds on the success that some commission men would achieve if they were filling the place of some preachers. Some time ago, I asked an acquaintance living in Missouri why he destroyed his orchard. His reply was, that the growing of fruit ceased to interest him. The whole bent of his inclinations resolved itself in efforts to grow fine and fancy stock, and while giving this an undivided attention, his orchard suffered, and rather than have an eye sore on his premises he put the orchard out of existence. I surely think his good sense should be commended. It is a flat of fate that there is no excellence without great labor, and we must have an unlimited amount of patience and perseverance, and perfect willingness to stand some dreary drudgery to accomplish desirable ends we have in view.

Too much judgment could not be applied in selecting the right quality of land for growing fruit. I know of land in the middle west that would grow 100 bushels of corn to the acre, and yet, would not be worth consideration for orchard purposes, as it lacks essential elements for fruit growing. If the grower must have cheap land far away from railroads, such land should be selected with a moral certainty that shipping facilities will become contiguous as the orchard develops in passing years. Emerson said that the education of a child should begin before it is born. The fruit grower should feel a full responsibility of proper caring for his trees in their young and tender condition. They may receive injuries at this critical period, which, while they may not destroy life, may leave blights, that will greatly affect their usefulness through all periods of existence. I think that the fruit grower should be very familiar with all the component parts of the soil, and should be ready at all times to make good the drafts for sustenance of growing trees, and, remembering

that wood and fruit are composed of distinct element, he should not forget to freely use a fertilizer that will furnish the food required for the fruit.

The attention trees received with each passing year affects their future for all time. If an orchardist neglects his trees for two or three years, or even one year, he can not, and should not, expect that extra care in the future would repair losses by indifference in the past. Again and again it must be impressed upon the apple grower to do his best in efforts to grow the finest fruit. We are living in an age of progress, and the quality of fruit growing half a century ago should be something out of date at the present time; and it is quite probable that the apples grown today will not compare in quality with the apples to be produced a half a century, or perhaps even a quarter of a century in the future. In the early days of stock growing, the average weight of an ox was 400 pounds; a sheep, 50 pounds; a horse, 600 pounds; a cow, 250 pounds. Note the developments in the paths of progress in these pursuits. Now we frequently see an ox that will weigh 2000 pounds; a sheep, weighing 400 to 500 pounds; and a cow, weighing from 1,000 to 1,500 pounds; instead of the diminutive horse, we now have horses weighing from 1,000 to 2,000 pounds. These facts seem almost like wonders that have been accomplished by evolution. The development of fruit shows also a splendid record. Starting with a poor, insignificant Siberian crab apple, a constant development unfolding through centuries now gives us the beautiful bell-flower, the Jonathan, Grimes Golden; and many scores of splendid varieties of apples, by no means excepting the much abused and much complimented Ben Davis. We can observe the gain and learn other processes of change. Starting with the common sun-flower we now see that crowning beauty, the chrysanthemum. The avenues to further opportunities for developing fruit, as well as all other products, are wide open to the earnest seeker. In the early days of emigration to Alaska, it was noted that the natives in that cold climate put on their furs, and hovered over fires, made from faggots, with a perfect unconsciousness of the rich inexhaustible coal mines not far beneath the surface of their daily walks. It would seem that too many are in the departments of horticulture with the same unconsciousness of what might be accomplished if they only used the foresight and the

necessary persistent endeavor to reach results. It always takes a reasonable effort on our part to accomplish our purpose.

Referring again to the work of marketing fruit, taking it for granted that the orchardist would pack nothing but good fruit, it is quite apparent that the best results in making sales in neighborhoods not exactly convenient to market would be by forming fruit associations along lines as indicated by letters that I have read. In cases where the apple grower does not care for the labor of sorting his fruit, it would seem to be better for him to sell his orchard in a lump to the buyer, and let him do his own sorting. On the other hand, if the grower understands all conditions, and is willing to meet all requirements, the buyer, nine times out of ten, would be willing to pay an extra price for the fruit if the grower would do the sorting and packing. The movement on the part of commission men in buying orchards in a lump was started solely for the reason that the packing of the growers in too many instances was unsatisfactory; and, no doubt, most of them would be willing to again buy by the barrel—when the packing necessary is assured satisfactory sales are assured. It must be borne in mind that apples should be placed in cold storage quickly as possible when picked. If an apple grower should have his own storage house, he should be careful to pack the apples so well that they will need no repacking when shipped for market. If he has no cold storage, and the apples are not sold, he should make all possible haste to place the fruit in the nearest cold storage house. A friend of mine in Illinois, who buys largely apples of New York orchards, recently told me that he had made some very serious mistakes by shipping the apples to Illinois instead of placing them in cold storage at once in New York. As a rule, at the time of apple harvests there is a great rush in the shipping of apples, and it is sometimes very difficult to get car service, and, as a consequence, this delay in taking care of the fruit inflicts injuries which have a most telling effect in decay and rotting later in the season. When apples are well secured in a cold storage house they can be taken out at the owner's pleasure, and shipped at times when there is a lack of fierce competition in securing car service. To the retailer, who hauls apples to town in boxes and baskets, it is essentially necessary to put his fruit in clean packages. There is a marked change in the exhibition of apples when they are taken from dirty baskets and musty boxes, and placed in packages that are bright, fresh and clean. The old saying, not how much, but how

good, is a good motto in growing fruit for market. We all know that fine fancy apples will frequently sell from six dollars to ten dollars per barrel, when the poorest qualities would be a drug on the market at one dollar per barrel. It certainly would be less trouble to handle ten barrels of apples worth 100 dollars than 100 barrels worth the same amount. There need be no needless fears or anxieties of any character of disposing of a crop of the best apples that can be produced. In early days, before railroads to the Pacific were constructed, did it seem a hardship to men to cross what was then known as the American plains, and put up with all manner of privations and their determined efforts to dig gold from the mountains? And, again, how cheerfully men have braved the perils of the sea the violence of enemies, and all sickness and dangers contingent to foreign countries in search for the diamonds that have been found in Australia and darkest Africa. It can be depended upon with the most reasonable assurance that wherever, and whenever first class fruits are produced, some enterprising buyer will discover the scent, and trace the trail until the price is secured. There is no question but that horticulture is in its infancy. It will require much research, the closest observations, and earnest attention to push it forward to its proper place before the people, but the strong union of effort, which comes from an increasing interest and added strength of horticultural societies all over the country—strives in development will be made with each passing year. The outlook is ample. It should be impressed, however, upon all the workers of the present age that they must be on the alert, be ready to recognize their opportunities and to take advantages, which will keep them fully abreast of the times. Wonderful, indeed, are the changes in the paths of progress during the past quarter of a century. Electricity has been enthroned in its power, giving support to millions of people in lucrative employment, and other changes of equal importance in the vast machinery of the world have been made, and we can readily see that millions and millions of people who are not now, and never will be fruit producers must be provided for by the foresight and industry of horticulturists. Great are the changes and conveniences made for the benefit of fruit growers in the past comparatively few years. Foreign markets have opened to receive large quantities of surplus crops; cold storage plants have come to the rescue to take good care of the crop while waiting for satisfactory market. There is a marked improvement in all

kinds of orchard implements and on hand tools. A noted progress in the methods of fertilizing and spraying, and always clearer and clearer views into the science of fruit growing; the iced cars for handling fruit when it is necessary, and countless advantages to all in the present age which were unknown and unheard of by the pioneers of the fruit industry.

Let us all in our day act well our part in efforts to reach higher degrees of perfection with a confidence of reaping a merited reward of having been useful in our time, of elevating the fruit industry to a higher standard, contributing measurably to prosperity in commercial circles, and in enhancing the happiness of many rural homes in which are engendered and fostered the true principles which give the strongest protection to the good order of state and national government.

DISCUSSION.

The President: I am sorry there is nobody here to stand up for the poor commission men.

The Secretary: Mr. President, I do not propose to stand up for the commission men; I am sure if there were any representatives of the species here they would be able to stand up for themselves. I had a promise from Mr. Sieg of Milwaukee to be here and the next I heard from him was from Honduras, that is somewhere down in the vicinity of the Equator and he recommended to me another man who is well able to present the subject and shortly after I had a letter from him from New Orleans, that he was on his way still farther south. Then I despatched a letter to a man in Duluth, Mr. Ferguson, whom some of you know, who, it was said, would be able to represent the commission man, and not long after I received a letter from him from somewhere in Alabama or Georgia, somewhere in that region, saying that he was on his way still farther south and so this society seems to have frightened these commission men away. But, joking aside, those men have business in the south at this time of the year for the purchase of tropical fruits, business meetings and that sort of thing. They wanted to come and they are very much interested and they hoped to be able to be here to speak on this subject. I had a very interesting letter from Mr. Sieg of

Milwaukee, saying that he hoped he could come. He brought out this point, that the word "commission man" should no longer be used because he said the progressive, up-to-date man wished to be known as a fruit and produce dealer; that he sent his agents out and contracted the crops, knew just where his fruit was coming from and did not depend on daily shipments on commission. I regret I was not here during the discussion, but in the past years there has been a tendency on the part of many of our fruit men to class all commission men, without distinction, as being robbers, and I have had that view, had absorbed it, and held to it pretty strongly until I came in contact with commission men and talked with them, without telling them all my business, and I was greatly surprised to find out that they were not all robbers and I would send to them without reserve any fruit that I might have without fear. They have things to contend with as well as the growers and while there may be rascals among them, as a rule, they mean to do right, because it is to their interest to do right.

Mr. Street: It is generally supposed that commission men will go to a hot climate anyway and there is no need of their being in a hurry about it, but I do not want to see the commission man exterminated too quickly. I find it is very handy when I have sold all the fruit I can sell and have a big surplus, some days fifty or one hundred cases, to have a place to put them and I should hate to see the commission man put out of business.

Mr. Toole: I am glad that the discussion took the turn that our President and our Secretary have given it in favor of the commission man, because it very seldom does. Last year we went after the commission men very hard and there was not much said for them, but I have listened and in all that has been said in these different papers in regard to marketing, a strong point was always made in favor of good goods, and I do not think you could rejoice the heart of the commission man more than by producing a first class article and packing it in a good, honest way. He is then in a position to do well by us and to make a profit for himself, and by helping ourselves we help him.

Mr. Hanchett: Since I have been in the fruit business it has been my privilege to become quite intimately acquainted

with some commission men, and I have been brought to realize that the commission man is always between two fires. He is the purchaser on one hand and the retailer on the other, and I had this very forcibly brought home to me one day in St. Paul; I was in the market there and I saw some strawberries brought in to a commission man; I was well acquainted with him and stopped and talked with him and examined them, and they were very small, poor strawberries, little Warfields that were almost all calyx, not much berry; calyx and sand is what they were made up of. The commission man was an Irishman and he had a rich Irish brogue, and he said to me, "I don't see what people are thinking of by sending such things on the market, they are hard to get rid of at any price." Just then a groceryman came up and stopped to talk berries. Mr. Commission Man stepped up promptly, and he said, "They are small, but I have always been told that small berries are the sweetest, and I actually believe they will make more fruit to the quart than the big berries." Now, it is true that there is a class of sharks who are going around like the roaring lion seeking whom they may devour, in the guise of a commission man; I have been sharked out of \$300 or \$400 by that class of man, but that was when I was cutting my eye teeth. We are troubled greatly in Sparta with this class of commission man. We have become so well acquainted with the commission man on the market with which we do business that we think we understand something as to who the reliable men are. It is one of the points of our association to try and protect our members against unreliable commission houses, but when a soliciting man of one of these swindling concerns visits our city, he always succeeds in getting quite a haul. He will perhaps first go to our board of directors and ask to be made an agent. Being refused, he goes out among our members and he slyly whispers in their ear that he wanted to become an agent, "But that board of directors you have got there, their price was so high, I could not buy of them, and they are getting a rake-off from you fellows by not letting me in." And of course he goes talking around the back street, and runs down the association officers and gets some men to ship him fruit, and the first fellow that sends a good price, and that proves that the board of directors are getting a rake-off, and then a whole lot send in some more, and that is the last that is heard of that commission house.

Mr. Goodman: Make those very men that do that pay a fine

of \$50 or \$25, just bring them right to time; if you have the right kind of an organization you can hold them. You can never ship to a commission man some surplus that you have to dispose of, he will never give you satisfaction that way. But you send to a commission man every day, and he knows that you are going to send that way and he will take care of your shipments. But if you sell all you can sell in your own way and send to the commission man only something that you cannot handle, I don't blame him very much if he gets the best of you. But the very men that agree to stand by your co-operative association will be the first to sneak off and sell to some other man, and if you can get tab on them, have rules and regulations and fine them if they make a shipment of one box to any one except the association.

Prof. Henry: I was not here when the paper was before you, but I wish to add my testimony to the great prominence of co-operation in all parts of Europe, and its incipient growth in this country. It is starting, and it should have every encouragement from our people. We all know the force of numbers; we all know how one man is nothing by himself, but a dozen men combined for one purpose accomplish a great deal. We can see that in other directions, in all lines of activity. In Europe it is marvelous to see the results of co-operation; men are co-operating in all possible lines to the good of those that are working together, and I want to see in the state of Wisconsin, now that our people have reached a certain stage of intelligence, that we have gotten to a certain stage of production, an intelligent handling of that which is produced.

The Paris fruits are sold at auction under the co-operative system; in Denmark, where the production is not horticultural in its nature, but where they produce pork and dairy products, and eggs, nearly all that product is sold under a co-operative system and the results are simply marvelous. The eggs are handled with the greatest skill, and they are sold to the customers from the four grades. All eggs are perfectly clean and actually have on them the stamp of the syndicate, as they call it, the local syndicate, and the number of individuals in that syndicate, and the date that the egg is laid, and little Denmark, one-quarter as large as Wisconsin, is now shipping 20,000,000 eggs and actually buying corn in Nebraska to help produce those eggs. The United States does not export any. We boast of our American products; our cotton, our wheat, our corn—all

the immense beef product and so on aggregates in total value \$11 for every man, woman and child in America; the United States sends out \$11 worth of horticultural products, cotton, beef, wheat, corn and oats, now, don't forget that when we speak of our boasted production in America, little Denmark, one-quarter as large as Wisconsin, and as many people, with poor land and good land mixed sends out \$33 for every man, woman and child in agricultural products, and she has done it through co-operation. We sit here and whine about the trusts and we boast about our intelligence and our freedom, and little Denmark that has over 50 pork packing establishments carried on by the farmers sends her pork into all the European countries, and the Armours and Swifts have tried to drive them out of the market, because they ship to the same markets that they do, and the Danish farmer is not afraid of the whole combine. Now, why cannot we co-operate here in Wisconsin, the horticulturists and the pork producers, all the people? We have intelligence and markets and opportunities.

The President: We have with us a man who is known to every one of you, by reputation at least; he is too modest to come forward and introduce himself, and I would like to have the members see this gentleman before we leave, and that is Mr. Matthew Crawford.

Mr. Crawford: Mr. President, I am not so much interested in this matter of marketing as I am in some other branches. The fact that impressed me was what this gentleman said about having something that was worth marketing, that was well graded and well packed, and that brought something to my mind that occurred a long time ago, when I was a young man working for my employer near Cleveland. We had a little dwarf pear orchard, and he took it into his head that he would buy a lot of bones, and he put an advertisement in the paper and bought tons and tons of bones, and they were all stored in this dwarf pear orchard, piled in perhaps three feet deep and there were a great many of them until he was ready to crush them. Well, of course, these bones lying there gave a great deal of fertility to the land, and there was no damage to the roots, they came up near the surface just where they wanted to, and such pears as were produced there were probably never carried into Cleveland before nor since. He took a lot of them in to his son who kept a store and his son said, "Father, what will I ask for these pears?" "About 25 cents apiece." "Oh, I can never get that."

"Well, if you can't, I will take them home again." My employer had some business around the city, was gone two or three hours and had to call at the store on his way home and they were all gone except perhaps half a dozen of them, all sold for 25 cents apiece. Now, they don't pay 25 cents apiece for pears in Cleveland, they don't pay any more there than they do anywhere else, but these pears were twice as nice as any others, and if he had asked 50 cents apiece I suppose he would have sold them.

Another experience I will give from the same man. He had six acres of red raspberries when I worked for him, and he picked as many as 60 bushels in a day, took them in and his son sold them. Every Saturday he would go in and get several hundred dollars to pay the help on the farm. He had about 100 acres which is near the center of the city now, but he had from 15 to 30 women and boys and he needed a great deal of money, and he got \$200 or \$300 a week for help. At the close of the strawberry season he thought that he had received about all of his money, and still he thought he had not got very much. The next Sunday after that his son and his wife came out to take dinner with the father; after dinner he said, "Father, I have \$1,000 raspberry money for you," and Mr. Lloyd was very much surprised, and after he got through expressing his surprise, his daughter said, "Well, father, I have \$1,000 raspberry money for you too." So he had \$2,000 from six acres more than he had expected he was going to get, but I can assure you that everything he did there was done right, everything was raised the very best and graded and marketed in the best style, and it has done me good all my life to think that I spent two years with that man when I was a boy.

Mr. W. H. Webb: I have been greatly impressed with the subject of co-operation, but underlying it I see one principle that has been brought out by nearly every speaker. It is not a question affecting primarily state horticulture as to marketing of berries but it is simply one of character, simply honesty underlying the whole problem. I have a little sympathy with the commission man, as I do with the under dog when he is pounded on, whether he is in the right or wrong, as a rule, and I do not think all of the dishonest men are in the commission houses handling fruit. The Secretary spoke of the honest commission man from Milwaukee who did not want to be named a commission man, namely, he wanted to be a produce dealer. He after-

wards named a man from Duluth that he hoped to get here, he also had taken to the south, Mr. Ferguson. I happened to know Mr. Ferguson, he went into the commission business because he was a producer; he was a farmer, a vegetable grower, a small fruit grower, a thoroughly honest Scotchman and he made both ends work. He did his own selling and he made so much of a success of it in that line himself that everybody else wanted to sell to Mr. Ferguson, and they got a square deal. But the main point in co-operation is that honest men may meet other honest men and find out the dishonest men and when we have done that we have solved the whole question, in my opinion.

Prof. Henry: I quite agree with that, that that solves it all. When you try to buy your boxes, when you try to get rates on the railroad, when you try to reach the consumer, make no mistakes about it, you need a central organization, you need an organization that telegraphs from Philadelphia, "Do not send any strawberries here, keep your shipments, we are flooded." You need an organization to tell you how to put it there, when to put it there; you need, when you buy your berry boxes, to buy them of such quality and price as to have the kind that the market wants. You need a thousand facts regarding your business that as a company, as a corporation, you can get, and you cannot do that when you stand alone. You have got to co-operate in one form or another. I met some gentlemen a short time ago in the city of Columbus, Ohio, and they said to me, "We represent 10,000 Italian farmers, we are here to buy agricultural machinery; we have come from Springfield, Ohio, where we have inspected the horticultural machinery and making our contracts, we will now go to certain other points; we represent 10,000 parties in Italy and we are buying horticultural machinery for them.

One reason why the English farmer is in such a deplorable position today is his "independence." If you rub up against the English farmer you will find him the finest gentleman. They have been the greatest farmers and independence has helped them to that, but they have got to compete now with people weaker in many ways, but people that stand together, and the poor English farmer today is one of the greatest sufferers. We have the Dutch farmer, the French farmer and Hungarian farmer, they are making their own markets and are in better condition, not because they are as good farmers as he is, as a rule, but because he is independent, he is proud of his independ-

ence. Now, my frineds, we have got to get together, that is all there is about it. You cannot farm on land in Wisconsin, cannot produce the best results, until you have cut out the expenses that are not necessary and you have such control of your markets, such arrangements that you can get your products marketed to the best advantage. Now, co-operation does not always mean putting up the prices, but it means cutting out the expenses, and we have learned too much of the benefits of standing together to see co-operation lag at this time.

WEDNESDAY—AFTERNOON SESSION.

STRAWBERRY REVIEW FOR 1905.

W. H. HANCHETT.

The strawberry crop for 1905 in the vicinity of Sparta was the most unsatisfactory crop harvested in several years. Yields were very small and quality very poor. Many theories were advanced as to the cause of the crop failure by different growers. The roots of the plants early in the season were bright and in an apparently healthy condition, showing no signs of winter killing. Later in the season they were found to be dead and rotting.

It has been customary to attribute this root killing of strawberries to winter killing, but our experience the past season seems to indicate that there is another cause, just what it is we can only make guesses at. The excessive amount of moisture doubtless had considerable to do with it as the soil was completely saturated from early in the spring until after the crop was harvested, preventing the needed air from penetrating to the roots. Variety seemed to have but little to do with it, as all were affected more or less. Warfield being affected the worst of any on our grounds and Dunlap the least, Dunlap giving us the only berries of really good quality that we had this season.

We do not have a very extended list on our Badger State Farm but rather confine ourselves to a few varieties that we find reliable croppers. Warfield, Dunlap and Enhance are our lead-

ers. August Luther has been our best extra early berry and Grandy our best late berry. We are testing Aroma and Sample for late and believe they will prove valuable.

We planted as an experiment last spring one-half acre to Dunlap which we gave the hedge row culture charging up the plants at \$2.50 per M. and all labor at 15 cents an hour and it may be of interest to members to know that this plot of one-half acre has cost us \$50.00 to date against \$35.00 per acre that a ten acre field, also planted last spring is owing us to date, that was given matted row culture. The cost of the hedge row culture could have been reduced materially had we been able to get boys to do the runner cutting.

We shall keep a careful record of the yield of this plot next season to determine whether or not the hedge row culture is profitable in a commercial way. The one-half acre plot was certainly an attractive looking strawberry field this fall before it received its winter covering, and we expect to get some fancy fruit from it next season.

C. L. RICHARDSON.

The strawberry crop in Chippewa county was below the average both in amount and quality. Individual patches did well but many fields produced only a half or a quarter crop. The first picking was June 15th or 16th rather later than usual, and the season closed a week earlier than usual. Our crop was the lightest in several years.

Of the 65 varieties I reported last year, we have dropped about 40. Many of the discarded varieties are valuable but it is extremely difficult to keep so many varieties.

There is little value in reporting upon old and well established varieties, and yet when they show new tendencies, these deviations become interesting. Cameron's Early was perhaps the earliest variety to fruit and proved fairly productive as heretofore, but still it is not satisfactory. Michels' is no better. We have about settled down to the Excelsior and Johnson's Early as the two best early varieties for loam and clay respectively.

Again the Haverland maintained its reputation as the best cropper on our grounds. It produces more quarts of medium to

large berries than any other variety we have ever had. The Dunlap, Bederwood, Warfield and a seedling of our own did about equally well for second plan.

The Warfield is unquestionably deteriorating, so is the Excelsior, and it is probably only a question of a few years until the Senator Dunlap begins to lose its vigor-productiveness. Up in our country a few of us think we see signs of deterioration in the Haverland.

Among the moderately late varieties we think the Marshall, Glen Mary, Aroma, Sample and Marie are the safest to tie to. Among the new comers we were the most favorably impressed by the Challenge. The plant is big and stocky. It looks so much like the Glen Mary the plants are hard to tell apart except at a distance.

The plants do not overcrowd but make a big enough row. The berry is blunt, rather rigid, large and extraordinarily firm, and of quality above the average. The Miller did not make a good showing. Lady Garrison looks promising but needs further trial. We keep a few of the Jerry Rusk for its large size, good shape and fancy quality.

We are sorry to report that the Splendid did not make a good showing. The plant never made a good row. There was nothing especially the matter but just a general failure to do well.

The two latest berries last year were the Midnight and Nettie. The Midnight was very late—later than the Rough Rider or Hunn. A few of its berries remained until about July 25th, but it was a dismal failure. We had a fine row of plants, but when the time came for berries the plants turned yellow or rusted. Many of them died outright. Many of the blossoms failed to set any fruit, and that which remained was hard and seedy. We shall give the midnight another trial on heavier, richer soil. The season was evidently unfavorable, and we think the plant would do better on a clay soil.

The Nettie is much more satisfactory. It produces scarcely enough plants but is very late and produces a fairly heavy crop of large shapely berries. The berries are rather soft, the flavor is insipid, and the color is a peculiar yellowish tinge which is not pleasing, resembling its parent the Hunn.

There were few complaints of pests this year. The leaf roller prevailed throughout our section to some extent, but did no serious damage.

Mr. Richardson: Right here I would like to say that we are Digitized by Google

having the same difficulty with the rotting of the roots that Mr. Hanchett spoke of as characteristic of the fields of Sparta. We have not been able as yet to find out whether it is general weakness of the plant or whether it is some species of pest that is attacking it. I am almost inclined to think at present that it is some form of disease and not merely winter killing. It acts in such a peculiar manner, but whether it is, it is a pretty serious problem up in our country and it is getting more serious every year. We have acres and acres throughout our section where the plants came out from winter quarters apparently looking well, and then when the blooming season came on they began to go down and they were dead before it was time for the first picking to take place.

DR. T. E. LOOPE.

I have not any paper prepared upon the strawberry, and I do not know very much about it anyway, although on that account I ought to be able to write a very good paper. I had only a medium crop of strawberries, but I probably had just as much as I deserved. We had serious pests, and in regard to the root killing, that trouble that has been spoken of here, I have my opinion about that. I have had that on my farm and I have always attributed that at my place to the winter and nothing else. I believe that with me, I am not talking about anybody else, but with me, I occasionally get a hard winter that is peculiarly hard on the strawberry and for that reason I get occasionally that same condition where the roots are diseased and where the plants do not do much, and any man who is foolish enough to grow strawberries as far north as Chippewa Falls would be liable to find that same trouble, and our friend Richardson comes from that region. I do not know but what it may be just as prevalent in the southern part of Wisconsin, I do not know anything about that.

As to varieties, I have not got any. There are only two that I have anything to do with and our friend Crawford is responsible for one of them, and that is the Dunlap; the other is the Warfield. I have had a dozen other varieties that I never could get many berries from. Understand that I do not say there are not other good berries in other localities, but with me the

Warfield and the Dunlap are the only ones that I will consider, I would not plant another one if you furnished it me that I know of.

We have occasional pests. I am not troubled with the leaf roller as a rule. Years ago I had some of the leaf roller work that made serious havoc with the berries, but of late years I have not had that. The greatest pest that I have to contend with is June grass, and there is good reason for that. The soil that I have seems to be peculiarly adapted to the growth of June grass and I seem to have plenty of seed in the ground and I can take care of my strawberry patch in first class condition up to the first of August, and in the spring my ground is covered with June grass and it grows and flourishes until the berries are picked and sometimes way above the vines in spite of all I can do, there is no use talking. I see most of you take care of your patches until the first of August and keep them well cleaned and well cultivated until you get through picking, it is not so with me, I grow berries in the grass and if my friend George J. were here, he would remind you of that any way, because he always talks of my growing berries in the grass, he has seen it himself, so that while I am not a strawberry grower, I still grow some strawberries every year, a few of them, but I will not take up your time, because there are many others here that are capable of giving you more information than I can.

M. S. KELLOGG, Janesville.

I am somewhat like our President, I have no prepared notes, and will simply give my review of the season as it has been impressed upon me by last year's work.

At Janesville the strawberry season opened on June 5th, and reached its height June 17th, being rather shorter in the first crop than as a rule with us in the southern portion of the state. The last picking of any quantity that was disposed of on the market was July 8th, so that the latter portion of the season really made up in length for the shortness of the forepart. With us, as has been stated by the other speakers, the quality of the berries this year, as far as flavor is concerned, was decidedly under the average. As regards size, our berries ran from me-

dium to good size, but in firmness were very much under the usual condition on account of the very wet season, in all, perhaps we had two-thirds of a crop.

Of the varieties that we grow, nearly all of them are what would be classed with the standard market sorts. We have found by costly and many tried experiments that the testing of new varieties is a business in itself, and have discontinued the planting in a large measure of many of the newer sorts, although we are testing many new varieties at the present time, besides those that we care for. I have in mind that there are 24, I believe that is the number, of sorts that we regard with any degree of making them a part of our strawberry department. In these the best early varieties with us have proven to be the Warfield and Bederwood; for mid-season, Clyde, Dunlap and Parson's Beauty, and in regard to the Parson's Beauty, there is the nearest approach to the Old Wilson that we have been able to find in all the varieties that we have ever tested. It gives us some of the very finest berries, and berries that will bring the very best price upon any market, it is firm, has good color, good size and ripens evenly. Our best late varieties are Sample and Klondike. Klondike will not do as a shipping sort, but for a local market or home consumption there is nothing that is better as far as quality is concerned.

I do not feel like taking up any more time, because I believe we will all gain more from the discussion that will follow these talks than we will from the talks themselves, and I will give way to the next speaker.

L. A. CARPENTER.

The strawberry question is pretty late to be before the people today, I think, and the subject of the season I think is about the same in all sections. We had a very wet season to begin with, and up to the middle of June we had so much water that it was almost impossible to do anything in the strawberry field. We left our strawberries covered until they began to start considerably in the spring, which held them back nearly a week. A great many of the growers in our section were picking berries in considerable quantities a week before we commenced, this last season, and those who had their berries ripen very early had a

great many soft berries. I do not think we have had in a great many years a better crop as to quality, and our yield was fully up to the average the past season. The Senator Dunlap and Warfield are our main varieties for market; they come in about mid-season. The Staple is our best variety that we have ever tested and we have planted considerable of that variety. They ripen their main crop a week ahead of the Warfield. The Arrow is the best late variety we have ever tried; it is similar to the Haviland, but with us it makes a better growth and yields more berries. They have a peculiar glossy appearance which makes them look very attractive in the box. The Michigan we have tried for several years, but have not found it a success in either plant or berry.

There has been a great deal of discussion about the merits of the hedge row and the old matted row system. We have always propagated our berries by the matted row system, but we are thinning them down so as to get them as near the hedge row system as possible. We find it takes a great deal of work to keep the runners in. For our four best varieties for market I would name the Warfield, Dunlap and Arrow for late, and the Staple for early.

STRAWBERRIES.

CHAS. L. PEARSON, Baraboo.

Up in the Devils Lake region we had a heavenly lot of strawberries last season notwithstanding our near proximity to the resort of his satanic majesty. Nearly all varieties were good. Everybody said "My berries are fine," and every farmer's garden "butted in" on the market and bought groceries for the family.

Irrigating plants were more ornamental than useful as heavy dews were of semi-annual occurrence.

Senator Dunlap who has for several years been a rival of Mr. Bederwood finally succeeded in winning Miss Warfield and now the happy pair are always seen together. When asked why she preferred the Senator, Miss Warfield replied that he was handsomer and stronger, had a healthier color and could earn more

money than Mr. Wood. Mr. Wood looks pale but says he does not want any partner and can earn a lot of money all by himself.

Aroma and Sample are a pair of heavy weights. They are a little slow but when pay day comes around they are the envy of their neighbors.

Clyde is pale and easily mashed, but earns good money in some positions. Bisel doesn't make much noise in the world but gets the dollars just the same. Splendid, Bubach and Haverland are a trio of good workers but they can't stand travel.

The past strawberry season was not as profitable financially as we hope next year will be, but it helped clinch some useful lessons, here are a few of them.

Buy good plants but don't pay an extra price for balloon juice, otherwise called pedigree. Half a dozen varieties are enough for main crop. Too many kinds will multiply your trouble. Don't let your plants mat thickly. You wouldn't expect much corn if the stalks were an inch apart. Don't wait for your berries to dry off before picking in a rainy time. Some years are materially wet most of the time. Don't depend on the mail in strawberry time. Put a telephone in your berry shed connected with the city central and the telegraph office,—use them. Make the distance between the berry field and the consumer as short as possible. When you get a load of berries send them to the station at a three minute clip. There'll be horses when berries are gone. Don't sell all of your berries yourself. The commission man wants to live. Don't hope to get fat in strawberry time. You'll lose about fifteen pounds for every thousand cases marketed. Don't go back on the cows, the pigs and the chickens. They'll help pay bills while strawberries rest. Don't smoke ten cent cigars in berry time. The man with the white blanket will be around in the fall asking what has become of your winter's wages. Don't get saucy to your pickers. They might reprimand, suspend or discharge you. Don't expect to get rich on strawberries in one year—it might take two.

DISCUSSION.

Prof. Whetzel: Speaking about the root diseases in strawberries, I should judge, from the descriptions that the different growers have given, which were all practically the same, that

the trouble you have is exactly the same as we have in the state of New York. Now, I have never grown any strawberries myself, I have never had many berries from my strawberry beds, because I just set them out last spring in my own garden, I had a few, but I had this trouble in my strawberries this summer, and while a number of people are inclined to think it is due to winter killing, I am inclined to agree with the gentleman who said it was due to some special disease. I will tell you why. If it were winter killing, I could not have the same disease in my garden, because the trouble came after my plants had been set out in the spring. I set my plants in the spring and along in the latter part of July and August the roots began to die, the leaves would curl up and turn brown and there would be only one or two roots holding the plant to the soil. These plants I set out made runners, and oftentimes you cannot tell the row where I had taken out the diseased plants, there were runners set and I have plants filling up those places, but that was even before the runners had established themselves, the whole plants had died. I have had lots of specimens of this trouble sent in and I have examined the roots very carefully, but I never succeeded in finding any fungus or bacteria that causes the trouble, but that does not signify that it is not there. Any plant botanist will tell you, I think, that it is very difficult to locate trouble in the roots of plants, because there are so many soil and fungous bacteria that you will get in the examination that you cannot tell from the microscope that any one causes the disease. So I spent a great deal of time last summer getting cultures, I never succeeded, although I did succeed getting bacteria, which when introduced into the stems of the leaves in plants that were kept in quite a moist condition, I got the blackening of the stems, and the dying of the leaves and even the killing of the crown and some of the roots, but that was in only one or two cases, and I could not really base an opinion upon it, but I believe it is due to a bacterial disease of the roots and the very fact that it comes so long after winter time inclines me to that opinion, at least the trouble we have I hardly think it is due to winter killing, because it frequently attacks plants that are set out in the spring which were strong and healthy. I hope we may be able to give you some light on the subject, because it is something we are going to work

on at the station during the next year. It is of considerable importance to the growers in the state of New York, and I judge from what you said that it was of very much importance to you.

Mr. Goodman: We have the same trouble down in Missouri and we have attributed it all to summer killing, especially during this last summer which was extremely hot and wet. I will ask you if such cause could not cause root killing as you have mentioned, having so much rain and extreme hot weather which would sunscald the roots?

Prof. Whetzel: Of course if the season is very wet, that lays the foundation for trouble in the soil, but the roots that I examined began dying mostly at the ends and worked mostly toward the top. Frequently you will find trouble; next to the crown you will notice that it is healthy, but below that it is dead. Of course it is possible that some weather condition might cause it, but it does not look that way at the present time, this problem we have to investigate.

Mr. Kellogg: Another question—would it not be a matter of fact that in this summer killing the tips of the roots would be the first destroyed, in place of those nearest to the crown?

Prof. Whetzel: If the water which was around the roots were excessively heated after a rain, it might be that the injury was done there. You must remember that the deeper portions of the roots would be the last to be heated, the heat would affect the upper surface of the soil first. The water does not heat so very rapidly as to heat the soil. If you have a notion that that causes the trouble, a good thing would be to test the temperature at different depths on a day that you think would cause the trouble.

Mr. Rowe: I would like to ask a question, whether or not this is found where there has been no freezing and thawing of the ground during the winter; in other words, has this trouble been found where the ground has been protected, so that there has been no freezing or thawing of the ground during the winter?

Prof. Whetzel: As I say, my plants had not been in the ground in the winter at all, but the disease appeared after I set them in the spring.

Mr. Rowe: Might not that have occurred during the freezing and thawing in the winter and you have not found the result until after you set them out?

Prof. Whetzel: In the ground where they had been growing?

Mr. Rowe: Yes; that was true with us over in the Grand Rapids fields, acres and acres of strawberries set out two years ago, the plants looked as fine as anything you ever saw when they were set out; those plants went before the middle of August right straight along where they were taken from beds that had not been heavily mulched so as to keep them from freezing and thawing during the winter. I myself had that season a special lot of Aromas and because they were so fine in the market I sold a lot of plants, something over forty thousand plants, just to neighbors. Now, every plant that came from the field that was not mulched before the middle of August was gone, that is, two thirds of them were gone, but from another patch of the same variety, on the same kind of ground that was heavily mulched, we did not lose any, not any of them were lost, they were a perfect success, and so I laid it to the fact that in that bed that was not mulched, that the ground would thaw about an inch or an inch and a half, then it would turn cold and freeze up and while it would not break the roots square off, it would bruise the sides of the roots and while digging them in the spring they looked fresh and nice as any roots could look, by the middle of August they were dead.

Prof. Whetzel: The plants that I grew came from our Experiment Station; they were very well mulched during the winter time. More than that, if you attribute it to the freezing and thawing of the upper inch of the soil, you would necessarily expect the upper inch of the root would be the one that would die, but that was not the case. The tips under that condition would have been frozen all winter.

Mr. Hanchett: I am decidedly satisfied that the injury to our strawberry crop was due to some other cause besides winter killing. I have made it a practice for years, the first thing in the spring after the frost is out of the ground, to go over our strawberry field, dig up a plant here and there, take it to the house and wash the roots out carefully and see what the color is, then take my knife, slice them up a little at a time to see how they look clear through. Last spring, after I had done this, I decided we were going to have a great strawberry crop. The roots looked actually as bright as though

they had been growing in snow all winter, and as far as the freezing was concerned, there was but very little frost in the ground anywhere. When the snow melted, it all soaked into the ground and I feel positively certain that it could not be due to winter killing last year, but it must be due to fungous disease or blight.

Mr. Smith: Well, we got the worst effect from it last season on a little rise of ground just up in a little hollow a couple of feet deep where the ground was dry, that is, as dry as any ground can be where it rains every day, and the plants had been mulched during the winter. We always mulch our strawberries in the winter,—but it started in a certain spot there and spread almost as round as a wheel, kept growing larger and larger as the season advanced, until the fruiting season was over, about I should think the middle of July perhaps it seemed to stop working. It always widened out that circle right on the edge, like setting a little fire in a bunch of dry grass and working out on the side. I made up my mind that it was some sort of contagious root disease.

Mr. Crawford: I am a little in doubt about is being winter killing, however, I will tell you a little experiment that I carried on in the field. That year I took up a lot of plants and packed them just exactly as if I were going to mail them, put parafine paper around them and then the heavier paper and took them out and laid them in an open frame out of doors where they froze and thawed all winter long, sometimes they would be thawed, sometimes they would be frozen. When the spring came I planted those strawberries out and they all grew and did well and had ripe berries in June. Now, it has been my practice very often, knowing that we are going to be short of time and short of help in the spring, to dig up the plants and root prune them and heel them in so that we can transplant them later in the season. We are troubled with lack of help in our neighborhood, because every man and boy that can work is taken into Akron or goes into some shop, so we cannot get help. So I take these plants when I have time and they are cut back to about an inch. Now, you would think that cutting the roots all off within an inch would be equivalent to winter killing but instead of that they send out a lot of nice white roots and then when I am ready to plant them out, in June, about the time berries

begin to ripen, they are well supplied with white feeding roots. I am so well pleased with that method that I have thought sometimes of doing that with all our plants. Naturally, to set the plants out and cut the roots off, that will make them send out new roots from the crown and from the short ends and make feeding roots and establish the plants.

Mr. Rowe: There is another question I would like to ask in connection with strawberry culture of these gentlemen presenting papers, and that is, approximately how much do they expect to spend on one acre, what does it cost you to grow an acre of berries ready to pick?

Mr. Hanchett: I have stated in my paper, about fifty dollars.

Mr. Utter: Let me ask if that includes the cost of fertilization?

Mr. Hanchett: No, it does not. All the fertilization we do is with stable manure that is brought from the stable and spread upon the field; the cost as given in my paper did not include that. We put on probably about ten loads of manure to the acre. The cost as stated in my paper was \$350 for ten acres, kept in matted row culture from last spring until they were ready for winter, that included the raising of the plants, that was matted row culture. A half acre of hedge row culture had cost us \$50. That includes the winter covering. They will cost us probably \$5.00 an acre more before they are ready to pick. I think that the cost of \$35 an acre is rather less than the average cost. I know we considered this field had been one of the least costly fields that we had ever planted and cared for the first year. I think that we might safely add from five to ten dollars per acre more to that for average conditions.

Mr. Smith: I never kept any tab directly on an acre of strawberries, but I think Mr. Hanchett's estimate is quite conservative, I am sure that it is if you take care of them later than the first of August. We do not put our cover crop in as the doctor does.

Mr. Kellogg: My estimate would be from \$45 to \$60 per acre, depending on the local condition and season.

Mr. Bingham: I never kept account of the expenses on an acre. I should judge from \$45 to \$50 would be a fair price.

The President: What does it cost in Minnesota?

Mr. Brackett: In answering a question of that kind, a man would have to know something about what kind of soil he had,

whether it was weedy or not, whether it had been neglected for a number of years and grown full of weeds. If you can do most of your cultivating, keep the weeds out with a cultivator, you can do it comparatively cheap, but if you have to depend on people to take the weeds out by hand, which you would have to do if the ground were filled with weeds, you could not do it for \$50 an acre, including price of plants. I should say on an average the cost through this country would be between fifty and sixty dollars.

Mr. Utter: I never kept account of the real cost, but I think it costs me at least \$20 an acre for fertilizers, fertilizing with manure, and the covering costs \$10 at least, and I think \$75 with my methods of cultivation would be a conservative estimate. Right along this line, let me ask if it is the practice to discontinue cultivation as early as possible, or how late in the season is it profitable to cultivate?

The President: I would like to hear from Mr. Crawford on cost.

Mr. Crawford: At Jolinsville, (?) Ohio, where they raise a great many strawberries, and they are nearly all grown in the hill, it costs \$100 an acre on an average.

Mr. Pearson: I have never kept accurate account; I should think probably about \$50 or \$60 an acre would cover the cost, the way I cultivate, for of course it depends, as the gentleman said, on how weedy the ground is, but sometimes our neighbors, in judging by their grounds, think it is not very weedy when it is. In one case one of my neighbors crossed my field and he said I was lucky to get my strawberries on ground that was not weedy. Well, that was the hardest piece I ever had to keep free from weeds; I did not attribute it so much to luck, either, that it was free from weeds, as to good hard work.

Mr. Richardson: I kept track, as near as I could, on three acres several years ago, estimating our rent at \$4 an acre and counting our help at \$1.50 a day, hoeing our field seven times and cultivating seventeen times during the season, estimating our expenses as near as we could of marketing them at our town five miles away, it cost us between \$96 and \$97 an acre.

Mr. Rowe: I want to follow that up with another question as to the gross returns per acre at these prices for cultivation. It now costs me \$135 to \$140 an acre; it used to cost me \$30.

Mr. Post: The thought came to me, it would be well to ask how long it has to run, and what the quality of strawberries is

that are raised; it makes a great deal of difference. The quality of strawberries depends on the cultivation to a great extent; that has a great deal to do with the question of what it costs to raise strawberries. I have a neighbor who runs a bed two years, and of course he can raise a lot of grass and a lot of strawberries, but if you want to get strawberries to supply a good market, you will have some expense. That is true in everything, and it costs me at least \$50 an acre, just mulching alone, to protect those strawberries as they should be, and get a first class crop, and when you say you cultivate seventeen times, and that is necessary, it costs you over \$100 to run a strawberry bed as it should be run.

The President: Now, let us take up Mr. Utter's question. How long do you cultivate?

Mr. Smith: Cultivate until the ground freezes in the fall.

Mr. Kellogg: Same here.

Mr. Hanchett: We cultivate until the latter part of September.

Mr. Utter: How deep should we cultivate, those last cultivations?

Mr. Smith: Shallow.

Mr. Kellogg: Shallow.

Mr. Utter: What do you call shallow?

Mr. Rowe: An inch and a half. Late cultivation is to cultivate between the rows, to keep them from taking root between the rows, because if they do they will come up through the mulch in the spring and they will be in your path and bother you.

The President: Now your question, Mr. Rowe, was what?

Mr. Rowe: What do you expect from the acre for the amount that you invested?

Mr. Utter: The results this last year of two and one-half acres was 1216 quarts, gross receipts about \$1,050. I would say one acre of this was carried over the third year, and that was cultivated and well kept, as well as my first year's bed, and was nearer a hedge row system in one of the years, and I had my largest berries on the third year. I would not advise as a rule a third year crop; I succeeded this one year.

The President: Mr. Crawford, how much do you get?

Mr. Crawford: I am unable to tell, Mr. President.

Mr. Rowe: The point I wanted to get at was simply this,

that in my own experience I have found that by increasing the amount that I put into an acre from \$40 or \$50 to \$130, that I have increased my returns from that acre more than six times. In other words, in putting in \$40 to \$50, the returns from an acre, taking an average in a period of five years, would be about \$90 to the acre in which I invested \$40 to \$50. Of course that was in a strawberry market where berries ran from 6 to 8 cents a quart, not having the prices that you have further north. But when I increased my amount of labor and amount of attention, to the bed, put in \$130 per acre, then I found I was getting a gross value of \$500 an acre off from the same amount of soil, but simply by the increase of labor, not the increase of fertilizer, but the increase of actual labor on that ground, and I account for it simply by this, that the water that goes up by capillary system to feed the roots of the plant, brings up at the same time plant food, brings up the mineral matter from below, and it naturally, consequently, deposits itself on the surface of the earth. I have got beyond the point of cultivating for the purpose of conserving moisture, I cultivate constantly for the purpose of keeping the food down where the plants can get it, and when you do that your moisture is conserved also, but it is not a question of conservation of moisture, it is a question of keeping the plant food down where the plants can get it.

The President: Mr. Rowe has the solution of the thing down pat. Now, are there opposing opinions. Mr. Kellogg; how much do you get?

Mr. Kellogg: That is a hard question to answer. We have never kept accurate record of our returns for our strawberry fields with regard to area, and I would say that our experience has been along the same line spoken of by Mr. Rowe, that the more you put in, the more you get out, aside from the fact of increasing the fertilizer; the more work you put on an acre, the more you will get, and the better crop you will get.

Mr. Hanchett: I have had a great deal, of contradictory experience in the matter. The largest crop of strawberries I ever harvested was on a piece of land that we bought from a neighbor and it was given the most slipshod cultivation that I ever saw, and yet we got the best strawberry crop out of that one acre that we ever harvested. I do not think it was a good plan at all, I tried the same method the next year to see if I could continue that method and did not get good results.

Mr. Richardson: The returns on this field of something less

than three acres which I spoke of, which cost us about \$97 an acre, were \$502.80 in returns from that field.

Mr. Smith: The price has so much to do with it that I hardly can say what can be gotten off an acre. Sometimes strawberries sell at forty cents a case and it is hard to find a buyer; that does not compare very favorably with the result when you can get \$1.25 to \$1.50 a case, so that it is a pretty difficult point to say anything upon. We do not consider that we get a good crop unless we get at least 100 or 200 cases to the acre and I want 500 or 550.

Mr. Brackett: It is pretty hard to decide what a man will get off an acre of strawberries unless he takes a number of years to base that theory on. Strawberries are rather an uncertain crop. You may have one year that you will have an immense crop, then you may skip two or three years with half a crop, and the only fair way to get at that would be to make some kind of attempt at an average of the different years. I remember two years ago I had an acre, almost all of them Dunlap, I took off that one acre 11,000 quarts of berries; I turned them over to our fruit growers' association, and they brought me that year \$600, and the price was rather low that year. You may think it is an old saying, that the man that tells the last story always has the best chance.

Mr. Webb: This being true, I want to tell Brother Brackett that he is not in it. I know of a man that netted \$700 on one-half acre last year, and he has netted not less than \$500 on half acres for the last five years.

The President: Where is that man?

Mr. Webb: That man is in Douglas county, Wisconsin, his name is D. W. Terry and he is a darkey.

Mr. Goodman: It seems to me we lose sight of the fact of how much these berries cost us and that depends on the ground in which you put your berries. We never think of planting berries down in southern Missouri unless we put them on new ground, and it never costs us more than \$25 to \$30 an acre to take care of them. We do not get from \$500 to \$600 an acre as returns from that, but we are perfectly satisfied if we get \$200 or \$250, sometimes it runs as high as \$400 or \$500, but with \$250 we are perfectly satisfied. But if you take new ground and put out your plants on that, it does not take more than one-quarter the amount of cultivation and care and attention that it does

on old ground, and on old ground it would cost us \$100 an acre. We can take care of that new ground for \$25 or \$30 an acre, and that is the place to plant strawberries, in my opinion. We are opening and clearing and planting new ground every year, and that is the only crop we plant, strawberries. It saves us a great deal of cultivation, not only that, but it is the proper place to grow them. We are clearing new ground every year.

Mr. Street: I would like to ask Mr. Rowe how far apart he puts his rows how wide he lets the runners widen out, and how he keeps the plants thinned on varieties such as Warfield and Dunlap?

Mr. Rowe: I set out a double row of plants four feet apart, the centers of the rows four feet apart, and I set out a double row of plants; the two rows, if they were close together would be about six inches apart. I use that system, because it is easy to show the men how to do it. I cut off all the first runners, and I allow the row to widen to just about 16 inches, and I keep the plants out just as near as possible so that the plants are not closer than three inches.

Mr. Street: What do you do to nip the stems.

Mr. Rowe: Hand work. It is all hand work, the "Man with the Hoe." I have tried the wheel hoe and I have tried all sorts of systems, but I find a man with the thumb nail, using it as he goes along, is the cheapest and most satisfactory.

Mr. Street: We had a little experience last year, and I am indebted to Mr. Coe for that, he put us on to that at our northern meeting. I put my strawberries in two feet-nine, and I put the plants two feet apart in the row, and I use the runner cutter, a kind of light cutter that Mr. Coe told us about; take a handle and a file, have the blacksmith turn it over and sharpen on the inside, and you can go along and use that and when you think the plants are getting too thick put it in criss cross, that will take out the weaker plants and leave the more solid plants. Do that along toward September, and that is the nicest way I have ever seen.

Mr. Rowe: That is the same proposition as when you let the plants grow and pull them out, then you lose the strength that goes toward making the crown. We want to build up the crown, so we do not allow the plants to make any more plants than we want. We never pull plants out with the roots, we cut off the runners. Let them make plants, but not more plants than you

want; as quick as you do that, you are exhausting the strength of the plant, wasting the strength, if you want to have a crown made there is where the extra expense comes in.

Mr. Pearson: I was a little surprised at the meeting I attended in Iowa where they recommended crossing the rows late in the fall with a smoothing harrow, with a team, and pulling out the weak plants. I would like to ask if there is any one here that has ever tried that.

The President: They must be pretty weak if you can pull them out and select as you are going.

Mr. Kellogg: Right along that line, would it not be a fact that if these same parties having this same soil, but putting in a little more work and thinning these plants out by hand, would not have returns that would be fourfold or sixfold, as has been proven on Michigan soil? I believe they would.

The President: Here was a question from the question box: "Is the Corsican a good variety of strawberry?"

Mr. Kellogg: Not in southern Wisconsin.

Mr. Moyle: It does well with me.

Mr. Hanchett: We have cropped it one season and it was very satisfactory.

Mr. Crawford: We had the Corsican in matted rows, it did moderately well, we could not find fault with it, but I saw it in another place where it was grown in hills and grown with greater care and they were very nice indeed.

The President: "Where a man has only four or five acres of land, can it be made to produce good crops of strawberries for any number of years?"

Mr. Crawford: My friend, Mr. Beaver, has grown strawberries more than twenty years on the same land, and he is the most successful grower of any I have met, but he does it all by hand and does it carefully, I do not think it can be done with a horse.

Mr. Pearson: I have land enough so that I change my strawberry ground around.

Mr. Hanchett: We have found that we always get the best results by rotating.

Mr. Smith: I have seen strawberries set quite a number of times on our grounds where the bed was plowed under in July and planted the following spring, and I never saw anything but almost a total failure as the result.

Mr. Richardson: We tried resetting on our old beds three times and every time our crop has been either a failure or very poor. It is not a success.

Mr. Moyle: I do not make a specialty of growing plants for berries, I grow the plants for plants; if I try to repeat, I get them mixed up, some of the plants live through in the beds. I always change off every year to new land.

The President: "How much special fertilizer for strawberries will it require for one acre of strawberries? The land has been in black raspberries for the last ten years and have good crops."

Mr. Kellogg: Twenty loads of stable manure to the acre.

Mr. Crawford: About half a ton of phosphate would suit us.

Mr. Goodman: If you want commercial fertilizer, get this bone phosphate, dry, put up by Armour and Swift.

The President: I believe it does not mean exactly what it says; I do not think it means a special fertilizer, because I think barnyard manure would do as well.

Mr. Periam: If we can get enough of it.

Mr. Pearson: I do not think ashes are good on our soils. I have used ashes on my clay soil and it seems to harden the soil, the berries are smaller, it made them a brown color and I do not want any more ashes.

Mr. Utter: I think probably his soil has enough lime, sixty-five per cent of ashes is lime. I think if you use potash you had better use it in the form of sulphate of potash, or muriate.

Mr. Brackett: If you have heavy soil with plenty of humus in the ground, but if you have a light soil it is a good deal better to use either some commercial fertilizer or use thoroughly rotted manure.

Mr. Smith: I think possibly this gentleman here would be like one of my neighbors who says that ashes are of no use. He said to me, "I put ashes on my garden, I put it on four inches deep and there ain't nothing grown there since."

Mr. Pearson: I put on fifty bushels to the acre.

PEDIGREE STRAWBERRY PLANTS.

MR. M. CRAWFORD, Ohio.

The strawberry has been my specialty for nearly half a century, and on this account I have been deeply interested in the subject under consideration from the time of its first appearance before the public to the present.

Before taking up the question, I wish to state by way of preface, that I have no intention of depreciating the practice of using good, thrifty, healthy stock for propagating purposes. On the contrary I believe in it thoroughly, and make it a rule of my business.

The theory which is to be discussed on the present occasion is this: That a given variety of the strawberry can be so changed by selection and manipulation as to develop to the highest degree its desirable traits, and eliminate its faults; and that these changes can be fixed; that is, established as permanent characteristics of the variety. Furthermore, it is asserted that plants which have been thus treated have by this means acquired a pedigree, hence they are denominated pedigree plants by their growers. Still further, this method of selecting and restricting is called breeding, and the growers are designated as breeders, and their plants as thoroughbreds.

Definitions.

Before proceeding to consider the subject, it will be necessary to have an understanding of the meaning of certain terms used in elaborating and advocating the theory in question, as pedigree, thoroughbred, ancestor, generation, offspring, breeder and the like. These expressions in this connection are incorrect and misleading. The word "pedigree" is defined in the dictionary as "line of ancestors; descent; lineage; genealogy; strain;—an account or registry of a line of ancestors."

"Thoroughbred" means "bred from the best blood, as horses.

An "ancestor" is "one from whom a person descends, either by the father or mother."

A "generation" is "a single step or stage in the succession of natural descent."

“Offspring” is defined as “generation; descendants, however remote, from the stock.”

The word “breed” has many definitions, but the one which harmonizes with the other terms used in the same connection is “to create; to occasion; to produce; to originate;” and a “breeder” is “one who produces.”

All these words are of similar import, and all point to the relation of parent and child, and therefore they can not justly be applied to the propagation of plants in any way except by seed.

Seeds and Buds.

All fruit-bearing plants are increased either by seeds or by buds, and the great majority by both. Buds include runners, layers, offsets, grafts and cuttings, top or root. Seeds reproduce the *species* to which they belong, and when two species are crossed the result is a hybrid. Buds invariably reproduce the *variety* from which they spring. A plant grown from a seed is a new creation, and may or may not resemble its parent or parents. A plant grown from a bud is not a new creation, nor a new generation. It is simply an extension or division of the original plant, is of the same variety and possesses the same traits. Removing a bud from a plant and setting it in the ground or in another plant causes no change in the variety, and a plant grown from another plant by bud or runner is not its offspring, nor is the original plant the ancestor of the other. There is no pedigree involved by this method of growing plants, however carefully the work may be done, nor is the grower a “breeder” in the true sense of the term. He is simply a propagator. The advocates of so-called pedigree plants make the mistake of reasoning from false premises. They assume that the propagation of strawberry plants by runners is parallel to the breeding of animals, or the growing of corn or wheat from seed, whereas there is no analogy between the two. The question is asked, “If selection is good with corn, why not with strawberries?” The answer is, because the ear of corn corresponds to the berry and not to the plant. The ear of corn contains a number of seeds, and so does the berry. Each of these seeds if sown will produce a new creation, but a plant grown from another plant is, as has been previously stated, merely an extension of the plant that produced it, and is of the same variety. It can

not be changed except by environment, and such change is not permanent: The argument that plants can be permanently improved by the selection of bud variations is founded upon a fallacy; that of assuming that plants grown from other plants are new creations, like those produced from seeds, which is not the case.

Pedigree.

In order to have a pedigree, plants must be grown from seeds, and in order to have a *known* pedigree, that is, "a registry of a line of ancestors," they must be grown by intention, not by accident. The most of our popular varieties of strawberries are chance seedlings. They have no known pedigree, nor can they by any possibility acquire one, for their parentage is unknown, and must forever remain so. Thus we see that the word pedigree can not properly be applied to strawberry plants grown from other plants, and hence there are no pedigree plants in the sense in which the expression is popularly used at the present day. The word "thoroughbred" used in a similar sense is also a misnomer.

Plant Breeders.

The growers of so-called pedigree plants are propagators, not breeders. The author writes a book; the printer increases the number of copies, but this does not make him an author. A true plant breeder is a grower who takes advantage of hereditary tendencies and endeavors to perpetuate points of excellence and combine desirable characteristics by producing plants from seed. He continues this process from generation to generation, and if he keeps a record of the parentage, his productions have a known pedigree. Plants grown by this method are real pedigree plants.

Prof. Sandsten, the plant breeder of your Wisconsin Agricultural College, says that there can be no plant breeding without seed.

Bud Variation.

Next comes the question, is there then no such thing as bud variation? There is, but it is temporary. It is found in fruit-bearing plants, vegetables and flowers; but it is due to conditions, and can not be made permanent. The idea that a variety can be improved by selecting buds from the most perfect

specimens for propagation seems so plausible at first thought that almost any one might consider it a forward step in the line of progress, but further consideration reveals the fallacy upon which it is founded. The proposition is not new, but dates back nearly or quite a century.

Just here a brief digression from the text may be pardonable for the purpose of illustration. McMahan's Gardening, published in 1819, advises the selection of apple scions from horizontal branches, as "they came into bearing sooner" than others. Forty years later, the idea was advanced that vertical scions would produce upright-growing trees, and horizontal scions, spreading trees. Simultaneously with the appearance of the new idea in regard to improving strawberries by selection came the theory that scions taken from trees with certain desirable traits would perpetuate those traits in other trees into which they were grafted but there seems to be no proof whatever of its correctness. It is true that one tree in an orchard may be better than others, even one branch may be more productive or yield handsomer fruit, it is also true that a skillful horticulturist can produce great changes in the habits of trees, but these variations and changes are due to situation, soil, light, food, moisture, treatment, in short to circumstances. They are not constitutional, and can not be perpetuated in other trees with different environment. An orchardist in Massachusetts gives an incident in his own experience which illustrates this point. He had an apple tree of the King variety growing where it received the drainage from the barnyard. It produced enormous apples, but they were coarse and poor keepers. From this tree he had one hundred others grafted, and they all produced King apples of the ordinary type.

The potato has been experimented with along this line by thousands of growers and many agricultural papers have advised their readers to save the fairest tubers from the most productive plants for seed, in order to improve the variety, or at least, to keep it from deteriorating; at the same time warning them not to plant the small ones, because "like begets like," unmindful of the fact that there is no begetting in such a case. A careful potato grower in Connecticut gives an account of his efforts to improve a certain variety by marking the finest hills and selecting the most perfect tubers from these for seed. He persevered in the work for eleven years, and then gave it up as a failure.

To return to the strawberry. A few years ago a variety called the Improved Parker Earle was sent out, purporting to have been derived from the original Parker Earle by selection, but when the two were placed together and given the same treatment, they were alike.

A well known strawberry grower of Iowa wrote me last year that he had propagated the Louis Gauthier for six years with a view to increasing its inclination to bear in the fall, but had gained nothing.

The reason why all experiments of this kind fail is because the characteristics of varieties are fixed by nature beyond the possibility of permanent change. We can produce variations of many kinds by our methods of managing, but all such are temporary. For instance: Two plants of the same variety may be set at the same time, one in a good situation and the other in a poor one. The first may receive the best of care, and the other be left to itself. The next year one will probably bear well and the other poorly; but if runners taken from these two plants are set in a new place and given the same treatment, they are likely to yield about alike when the next fruiting time comes.

Try another experiment. Take a popular variety having one point in which improvement is desirable. Make an effort to increase the size of the Warfield. Select the plants which bear the largest berries, and give them the best possible cultivation and management. From these select again and continue this process until satisfied that the fruit has reached the maximum size of which the variety is capable. This will probably come to pass the first year, but further trials may be made if desired. At the end of the time fixed upon for the test take plants from this bed and set them in a new place. In the same bed set an equal number of plants of the same variety taken from a plantation which has received ordinary or scant care, or perhaps has been neglected for the same length of time. Give them the same treatment in every particular, and when they come into bearing there will be no perceptible difference in the size of the fruit.

When I began the investigation of this pedigree question about two years ago, I advertised for plants which had been growing under neglect for a long time. I received many varieties from many different localities. Some came from an old orchard where they had roughed it for thirty years, some from abandoned beds, and many from out-of-the-way places where

they had received no attention. A few were regular nursery-grown stock from reliable growers. I gave them good care, and last year they all blossomed and bore fruit, "each after its kind." Nearly all of those waifs of the wilderness yielded crops that would have been a credit to plants that had been petted as long as they had been neglected.

Suppose for a moment that the bud variations found in plants could be made permanent, how long would varieties retain their identity? One grower would find one valuable variation, and another, another. Each by judicious management would raise his selection to the highest point of excellence where it would become fixed. On the other hand, plants of the same variety poorly cared for or left to themselves would deteriorate, and why should not this condition also become fixed? The original variety would be lost between these two extremes.

In spite of all our efforts, varieties retain their individuality. The law that no fixed or permanent change in their characteristics can be produced by any amount of manipulation is as inflexible as the multiplication table. It may seem that sports are an exception to this rule, but they are not the result of effort. They simply come. Among flowers they are not infrequent, but in fruit-bearing plants they occur very rarely, if at all. Even if they were common they would afford no argument in favor of the theory of the permanent improvement of varieties by selection, for a lifetime of the most painstaking effort could not produce a sport.

One More Question.

In the foregoing pages I have endeavored to show that bud variation in plants cannot be made permanent; that the theory of permanent improvement in varieties by selecting plants as by selecting seeds is a fallacy; that propagating plants by runners is not breeding, nor are those who do the work breeders; and that plants thus propagated, by any system whatever, can not acquire a pedigree in the process, and hence they are not pedigree nor thoroughbred plants. After all these points have been considered and disposed of, one question still remains to be answered, and it is an important one. Are so-called pedigree plants superior to other well grown and healthy ones for producing fruit? The strawberry industry in this country has assumed immense proportions within the last few years and many

growers now devote themselves to it exclusively. To them and to others in varying degrees, the matter of a larger or smaller crop is of great moment. The plants depended upon to yield the crop have much to do with the results, and planters naturally desire to obtain the best. Many have made tests to assist them in determining the question of merit, and many others have tests now in progress for the same purpose. Since commencing the investigation before alluded to, I have received about a hundred letters from growers who had tried so-called pedigree plants side by side with others to see how they would compare. The writer of one of these letters considered the so-called pedigree plants decidedly superior, and gave an account of tests which had resulted in their favor. Three or four expressed belief in the theory, but had made no tests. Among all the others not one had found the so-called pedigree plants any better than common ones, and many pronounced them inferior, the plants being smaller, their growth less vigorous, and their yield disappointing. What berry growers want is first class stock, good strong plants, whatever the method by which they are grown, or the name by which they are called. They must stand on their own merits, and be they designated pedigree or common, good plants are satisfactory, and poor ones are exactly the opposite. It is customary for those who grow plants for sale to use good thrifty stock for propagating purposes as a foundation for the same kind to sell. If the advocates of the pedigree idea choose to select their stock plants one by one, it is a harmless pastime. The resulting stock is none the worse for the selection, and many tests and observations have shown that it is no better.

Prof. Troop, of the Indiana Experiment Station, wrote last month in reply to an inquiry, "The Pedigreed plants were away the poorest in point of yield this last season. I am going to give them another trial."

The Ohio Experiment Station in its strawberry bulletin for 1905 gives an article on "Pedigree Strawberry plants," also an account of tests carried on at the Station, from both of which I will quote in closing:

"The word 'pedigree' as it is used with reference to strawberry plants is a misnomer. It tends to confusion in the minds of many, and leads to deception. The word is used out of its true sense to convey the belief that a condition exists

which does not and can not exist, or if it could exist would have no value.

"One may find what appears to be an improved strain of some variety of strawberry. He may accidentally stumble upon it, or he may systematically search for it. He may resort to whatever means or methods may theoretically seem most likely to yield the best results, but in all cases the supposed improvement must be put to the test. No pseudo-scientific nor semi-scientific explanation of how it was done will prove that such plants are in any way superior to other plants of the same variety. The proof must come through trial alone. In all cases the final test is in the trial pot. In no other way can we estimate the effects of environment.

"The Experiment Station has put some of these so-called pedigree plants to the test, and they have been found wanting. In 1903 seven varieties were on trial. An equal number of so-called pedigree plants and of plants of the same variety from a reliable grower were planted side by side and given the same care. Five of the seven varieties gave better yields from the common than from the so-called pedigree plants. In 1905 eight varieties from the two sources were on trial. There was a uniform and comparable stand, except in the case of the Bubach, the common plants making a poor stand. Not rejecting the Bubach, four varieties of the so-called pedigree stock took the lead against four of the common stock. The positions of the Warfield and Sample were reversed in the two seasons. The results of these two trials were about the same as might have been expected had all the plants come from one grower. The results are inconclusive, which negatives the claims made for so-called pedigree plants."

DISCUSSION.

Prof. Hedrick: I do not want to get into a discussion as to the philosophy of this matter of plant selection and pedigree plants, but I do want to cite a few instances that have come under my own observation and a few experiments, for that matter.

I suppose the notion of pedigree plants, at least the term,

which is a very unfortunate term, originated with Mr. R. M. Kellogg in Michigan. I was in Michigan and connected with the Michigan Experiment Station when Mr. Kellogg began his so-called pedigree plant system of breeding strawberries. At the Michigan Horticultural College we were asked to test these plants, and we began using Mr. Kellogg's plants and we began selecting plants on our own responsibility, leaving out of consideration Mr. Kellogg's plants, and, by the way, many of the tests with pedigree plants have been carried on with plants brought from Mr. Kellogg's place, and I think that unfortunate, but, taking our own experiments, we found, carrying on experiments in the greenhouse so that we could control conditions absolutely, that the Bederwood selected for three or four years and compared with the Bederwood grown out of doors, several hundred plants in pots in the same kind of soil, in the same temperature, all conditions the same, we found a most striking difference. Mr. Rowe, who has just gone out, frequently saw the experiment in the greenhouse and knows very well the outcome of the experiment. I am not sure but Mr. Moore, who sits here and who is connected with your Experiment Station, also saw the experiment, which was a decided success in all respects.

That is one experiment with strawberries. The same thing, Mr. President, was carried on a much greater length of time with the violet, and Mr. Gunderson, the florist at the Michigan Horticultural College at the present time, has a strain of violets bred up for the past ten years that is superior to any violet that I know in the whole country, and I go about a great deal, and see violets in different establishments throughout the violet-growing season. I want to cite some other facts, I do not want to become tiresome, but I believe in this matter of plant selection—I do no want to say "pedigree," but in the matter of breeding, of plant selection. Last fall I visited the fruit farm of Mr. George Powell on the Hudson. Mr. Powell had found in his orchard a tree of the Duchess that differed from others, the fruit was superior and bearing qualities were superior. He found this tree a number of years ago and immediately began grafting other trees in this orchard and propagating the other stock from this good tree. Those trees that were so propagated are superior in every re-

spect, any one only needs to see the fruit of these trees to be convinced of the superiority of these grafts.

A few weeks ago I was in New Orleans and visited a sugar plantation. As you may know, sugarcane is never grown from seed, it does not produce seed, it is propagated vegetatively. I was told there that they were getting new varieties continually and in fact all their varieties must come from variations which come from the sugar cane propagated in this way without seeds, they have no other means of getting new generations, but simply by selecting these variations which we know occur in all plants.

It must be recognized as a fact that there are other plants which never have seed, yet vary and form varieties. There are several varieties of horseradish, yet the horseradish never bears seed. There are innumerable varieties of pineapples, yet the pineapples never bear seed. There are several varieties of top onions, yet the top onion never bears seed, and so on, we can enumerate a number of flowers propagated vegetatively always, yet which run into variation and these variations are perpetuated and made permanent and handed down from one generation to another.

We might quibble over that term "generation," I suspect we can find that word more properly used, yet we need not go into a discussion of that, even with the plants that are propagated vegetatively. I have cited all these examples, because I most thoroughly believe in the practice of plant selection. I believe it is one great means by which we may improve our plants. I admit that there has been a great deal of fraud practiced in regard to pedigree strawberry plants; I greatly regret that the matter has come up in the last two years in the way in which it has, to check the growing opinion among fruit men that we can improve our plants by plant selection, even though we propagate them always vegetatively.

Mr. Brackett: I have been in the fruit business all my life and in the propagation of trees, and I will say this, that I do not think that the old Baldwin apple that has been probably fifty years in cultivation has ever been improved. I think the Baldwin apple is a Baldwin apple, just as it always has been. I think the old Rhode Island Greening is just the same as it was fifty years ago. I do not think you can take one

part of the original tree, which we do when we originate a tree,—we take one part of that tree and graft it only as a portion of the same thing carried right along, by grafting it onto other stock you have not changed the nature of that tree at all, and I do not believe you are able to change the nature of that tree by putting it into another stock, I think you have to have the same tree identically. You may change it, but I do not think there is a man in the house that thinks that if you take two Wealthy apple trees, or Duchess apple trees, one of them growing in the South under the worst circumstances, never had a crop, never had grown apples except under cultivation; take another grown under the most favorable circumstances, large, nice apples, take a scion of each one of those trees, graft them on another tree, and I do not think there is a man that will contend that two apples obtained from those two grafts would be any different. They would be identically the same. But this pedigree business has been taken up, in my opinion, by men who are after "suckers," and they are catching them.

Prof. Beach: I enjoyed exceedingly this practical presentation of this subject by my friend Crawford. It is, I believe, the strongest presentation of the subject from the view point of a practical man that I have ever heard, and I agree wholly with the main points that he has made, so far as practice is concerned particularly with reference to the strawberry. At the same time I cannot agree with him that the man who originates a new variety has done the same thing in kind as the man who has written a book and handed it over to the printers, and that multiplication of plants by sectional propagation, that is to say, by taking a piece of plant and propagating it is the same as multiplying books by a printer. I say I do not agree with him, because I have evidence that does not agree with him and so have you. I believe for the practical grower of strawberries, as for the practical grower of carnations the best thing to do is to find the best varieties and hold to your faith in the permanency of those varieties and propagate them. But at the same time, those who go into the subject and make a study of it surely will find evidence that there do come in variations in those varieties when they propagate them. My friend spoke of the Baldwin apple. Now, as a matter of fact, I was born in the Baldwin country and

have lived there for a great many years, and I know that there are differences in the Baldwins that are propagated; we recognize the Blue Baldwin or the Gray Baldwin as different from the Red Baldwin and so, too, with regard to violets. Prof. Hedrick spoke of the violets in their greenhouses in Michigan, they will find the same thing mentioned by Dr. Galloway, in Washington, in his little book in which he shows that they increase in ratio of three by making selections of the plants used in propagating, a case entirely analogous to the propagation of strawberries. So we might split hairs over the fine scientific points in regard to this article, at the same time I want to indorse the general spirit of it. I believe it presents the proposition in a sound, practical way.

Prof. Hedrick: I would like to say one word. I fear, in following Mr. Crawford and in speaking rather vigorously in favor of plant selection, I may have left a wrong impression. I am not here to defend pedigree plants as sold by many nurserymen. I feared my remarks might be construed by some as being uncomplimentary to Mr. Crawford. Not a bit of it. I greatly enjoyed his paper, and I think that his position in regard to the pedigree plants is a good one for the general grower of plants and to follow in purchasing plants. But I do want most emphatically to controvert what has been set forth as to the value of plant selection to a grower who wants to go ahead and select plants as they should be selected, to put in practice the principles of plant selection as they are applied by florists, as they are applied somewhat by animal breeders and as they may be applied by the fruit growers.

Prof. Sandsten: Mr. President, I should not talk on this subject were it not for the fact that my name was mentioned in Mr. Crawford's paper. I heartily agree with Mr. Crawford's contention on plant breeding, and I say with the gentleman, I deprecate the stand taken by strawberry growers in calling them pedigree plants, but I do not quite agree with Mr. Crawford on his idea that plants do not vary. Now, the variability of plants is one of the very foundations of scientific horticulture and plants are very susceptible to environment or the different environmental conditions, such as soil and temperature and rain fall, and the fact is that we should look upon plants not as a collection, but as individuals and even go so far as to look upon individual buds as individuals and

there is a great deal in selection. It is a selection and not a breeding, and we can improve varieties by selection.

Mr. Kellogg: This topic of pedigree plants is one that we are all interested in. Now, speaking as a member of the nursery fraternity, if the variation of plant buds is sufficient to warrant us in stating that there is an increase in productiveness or other desirable qualities by plant selection or bud selection, would it not be true that those who have been engaged in the production of trees and plants for a dozen or fifteen years would have produced a variety or strain which they would claim would be superior to any other and that those who are now producing the trees in this country would have strains of the Duchess apple that would be as many as the sands of the sea, and I believe the paper covers the ground entirely and that a variety once established is established for ever.

Prof. Sandsten: I take exception to that, I do not want to be arbitrary, but I take exception to it, and I will show you if you will come up to the green house that we have plants grown from seeds in three generations, giving us different varieties through the seed, that is just simply variation by environment.

Mr. Goodman: I want to indorse every word that friend Crawford said in regard to the nomenclature in which the term "pedigree plant" is used, because over fifty times a year I am called upon as Secretary of our State Horticultural Society to answer the question whether pedigreed plants can be obtained. I say, no, there is no such thing as pedigreed plants, because pedigree must come from seed the same as Mr. Crawford has outlined, strictly, that is correct. But I must take issue to a certain extent with him on the idea of plants always being the same. We have planted, during the last twenty years, something over half a million of apple trees in our orchards and of all those half million of apple trees a great many have come into bearing. We have in places two hundred acres of Ben Davis or Jonathan together, and I can point you to the individuality of many of these trees, one as nicely distinct from the other almost as if they were grown in a different country and sometimes so much so that both in quality and size and color it would strike you at once as something peculiarly individual, and I say, there is individuality in

every tree which we grow that is worth paying attention to and that individuality of the tree I say is worth propagating, if it is what we want, and we have during the last fifteen years made a selection of our Ben Davis, of our Gano, of our Jonathan and our Grimes Golden, and Ingraham, and we have selected for a certain type, not for the largest, but for a certain type, and do you know that those varieties, those types, planted and grown we find maintain that individuality in our orchard tree, and that that orchard tree that is so propogated and so cared for, just like the rest of them, is worth today twice as much in our orchard as are some of the indiscriminate propagations which we had. Now, I do not mean by that that this is done generally, and you can not go to a nurseryman and ask him to do this thing, because they will not follow it closely enough. Just the same, as many of these experimenters have come to me about the strawberry question, saying, I have procured strawberry plants from such a plant and from such a man, he sent out pedigree plants and compared them with my own, it is not a fair test. I do not know how correctly those pedigree plants may have been selected, whether they have been correctly selected for that type which you want for your ground and you will take his idea of that and taking your plants that you are growing, it is not fair. But you take those varieties and make the selection yourself for ten years and you will get an individuality, a type of variety that certainly will vary very much, and it will reproduce that variation in the plant itself. And I want to call attention also to one other point. In our Experiment Station at Columbia, we met with the same violet plant. We propagated from one violet plant, one sprout that came from one plant that came from a certain number of seeds and we took out of ten plants which we had selected one that produced the least number of blossoms; we took out of those ten plants one that produced the most blossoms and then we propagated from each one of these plants again and we selected from one of those that produced the least number of blossoms each time and from the other, those that produced the most blossoms each time and we made a greater variation than Prof. Hedrick spoke to you about, one to three, we made a variation of one to five, that is three propagations removed from the seed. I am sure, Mr. President, that there is just as much individuality in the

trees of my orchard as there is in you and me. We are men, but your individuality is entirely different from mine. Do you know the case of the old Baldwin apple up here in the East where a man sued the nurseryman after he had planted twenty acres of Baldwin trees and they all came into bearing, sued the nurseryman because they were not Baldwins at all. He did so, and yet they were Baldwin apples, but they were so immature and so poorly colored that the man hardly recognized them and all the neighbors said they were not, but when they came to be examined, experts went there, they were found to be real Baldwins. That was one case where the offshoot had gone so far away that it caused a variation and that variation continued, so I believe there is a principle that we ought to follow out, and it will pay us as practical fruit growers to select the best that we can of each type of fruits that we grow and propagate from them, and it certainly cannot do us any damage, and I pay nurserymen now that will grow the trees for me. I have my orchard trees marked every year, those that give the best color, the best quality, those that are the most productive of any trees in the orchard, and every year we go through with the nurseryman and we mark those trees that give those qualities which I want, and I have him propagate those, and I pay him twice, sometimes three times as much for the trees grown that way from my own planting. Now, it certainly can do us no harm to continue this matter, and I am sure, as far as I am concerned, I am positive it is very much of an advantage in the improvement of our fruit trees and also in other lines.

Mr. Brackett: Is it not true that all varieties of potatoes that we have originated and propagated from the tubers, not from the seed, have degenerated and become comparatively worthless varieties instead of being improved from the first quality?

Mr. Goodman: Never, sir, when the principles of plant propagation are followed continually, never; but because of neglect and because of bad environment and bad fertilizing they have done so. But if you will select carefully the very best type of every one of those things for years, and I tell you they will not deteriorate.

Sec. Cranefield: I have hesitated to say anything on this subject, because I am not well informed, but I cannot refrain,

now that the discussion has taken this turn in regard to potatoes, I can give you something of the experiment that was conducted by the late Prof. Goff in this line. I helped with the work, carried the detail of the work, and I hesitate to give you the results lest you should not believe it. Several years ago Prof. Goff started an experiment in this same line of selection from a field of potatoes, selecting from the best hill, and from the poorest hill, carrying that through a number of years, breeding up and breeding down, and there was a gain of 180 per cent in favor of the best. A plant is not a fixed entity, but a plastic body, and by selection and by manipulation the horticulturist is able to do with that plant almost anything he pleases. He cannot make a potato from a pumpkin, but he can make something from the potato that will almost resemble a pumpkin in size. And not only is a plant an individual and a plastic body, but every bud on a tree is an individual, and by selection of certain buds we can obtain what is practically a new variety. Why, if plants were fixed entities, where would be the progress, except perhaps along the line of seed selection, no one denies that it is true, that is the only plant breeding. I also confidently believe that nine-tenths, or a larger per cent of this talk by nurserymen about pedigree plants, is humbug; I do believe, on the other hand, that it is possible by selection of strawberry plants, certain buds from a plant, certain runners, that we may improve the quality, and if we were to select the following year from that selected runner, we will improve still further, and we will have what? Not a field of pedigreed plants, but a field of plants of new variety which the nurseryman will be fully justified in putting on the market as a variety.

Mr. Hatch: I would like to put myself on record as a practical orchardist in saying that there is an idea in this individuality of orchard trees that is worth looking into. I have observed the thing for two or three years. I have trees under the same environment, same variety, one tree would be worth almost double what the other would be. It is a self-evident proposition with me that if you take a graft from that best tree and continue on that line, you would certainly do something for the improvement of the variety. I want to say another word about pedigreed strawberries, I had a little experience in that line. One of my neighbors got plants from

the man that started it over in Michigan. She took them out and she said to me, "If you want those plants, take them." I set them at the lower end of a bed where the soil was in better condition than where another variety was planted, but last year, while the other plants were bearing there were no berries at this lower end, and those were the pedigreed plants.

Mr. Underwood: As a nurseryman I would like to say that in the propagation of apple trees, for example, taking the Wealthy apple—up in our country we propagate more Wealthys than anything else—and we read in the papers that the tree man should propagate these trees from the bearing orchard trees, and I will say that that is an impossibility, it cannot be done in a commercial way. But I want to ask this, supposing we propagate Wealthy apple trees for a term of ten or fifteen or twenty-five years, taking the wood from the nursery tree, never taking it from the fruiting tree, using that same wood that we have in the nursery, as is done in most nurseries, what will be the effect? If this bud variation theory is correct, at the end of fifteen or twenty or twenty-five years, will the Wealthy apple be the same apple, or is it going to be a different apple? If there is going to be a variation made, will it be a better or a poorer apple, can that be answered?

Mr. Beach: I want to say just a word on this question. I take it in that as individuals, where you do not make a selection, the result would be what you would expect, an indiscriminate selection of the bud. That is entirely different from seeing some tree going into fruiting that has particularly desirable features that you wish to perpetuate, then going to that tree, taking and propagating the wood from that tree, then you are not sure that you are going to get that reproduced, because that variation may be due to the environment. But if you propagate as our friend Goodman says he has done, and find that under propagation it holds, then you have a distinct step in advance. Now, you take, for instance, the case of the Gano apple, it is right along the line this gentleman has spoken of. I was talking with Mr. Gano, just a few weeks ago, he declares they do not know where the Gano came from, except the tree was planted in the orchard with Ben Davis trees. My opinion is that it was simply a bud sport of the Ben Davis. Take the trees in the nursery, they are so much alike, it is almost impossible to tell the difference, the difference is

in the coloring of the fruit. That may answer the question in part.

Mr. Underwood: Here is what I am trying to get at. We are growing Wealthy apples in quantity, we know that they are the true Wealthy apple, we are sending them out all over the state and they bear within a few years and we know that we have the true Wealthy apple, but the question is, whether in propagating them, not from orchard trees, but from nursery trees, are we maintaining a fixed variety, or are we aiming at something that will be different in a given length of time? Will the Wealthy apple be true, as we are propagating it, in twenty-five years from now?

Prof. Beach: It will be the true Wealthy twenty-five years from now. There will be some slight variations perhaps that you will not notice. Some of these variations are so slight that unless we study them as any breeder must study them, we might not see those variations, but we would have what would pass for the Wealthy apple. But, if I were an orchardist in Minnesota, I should buy my Wealthy apple trees of you, or some other good stock that you have that is hardy, and then I would go to a bearing tree that had the particular type of Wealthy that I most admired, and that was worth the most to me, and would take buds and would bud over every tree that I got from that particular type in the hope that I might get something better than you could give me. You, as a nurseryman, cannot do that, that is what the orchardist must do for himself, and I am very glad the orchardist is doing something for his own salvation, the nurseryman cannot do it all.

Mr. Street: This forenoon there were very few to take the part of the commission man; this afternoon there is hardly anybody here to say a word for this man that I believe has done more for the strawberry business in this country than any other man, and I would be ashamed of the Wisconsin report if there were nothing said in his favor. I want to ask this question, is there a man in this country that has done more for his fellowmen in the strawberry business, getting them to do more cultivating and taking more care of their strawberries than R. M. Kellogg?

Mr. Crawford: I believe just as the gentleman does, I believe R. M. Kellogg has done more to advance good strawberry culture than any other man in the United States, and I

have been sorry all the time that I was investigating this question that I have seemed to be opposing a man who has done so much. Now, I have had no fight with R. M. Kellogg when he was alive, and I have not not after he is dead. He was a friend of mine; he has been days at my house, a man that I liked very much, but I do not believe in his theory, but I want to say that I think R. M. Kellogg did more for strawberry culture than any other man that ever lived in this country or any other country.

Mr. Moyle: I am glad that these last remarks have been made. You know I am a nurseryman, and I got my dose this afternoon with the rest of the crowd, but I look at it like this: You know we nurserymen have to deal with the subdued tenth of humanity, from the nurseryman's point of view, and the result is we have to bring up before them some vivid picture whereby we can get their attention attracted so that they will plant and grow nursery stock, and Mr. Kellogg struck the happy thought in introducing strawberries under this system as pedigreed plants, and I am satisfied to-day that people thought they got something better than the ordinary and took better care of them and consequently they got good strawberries, and in the long run it was a good deal all around.

Mr. Periam: That does not touch the question of pedigree at all; it is the fixing of an impossible word upon the propagation of plants. You will concede there is no such thing as a pedigree in plants from seeds or bulbs, you have got to have the two individuals to start with. It is the same as the word "thoroughbred," as applied properly to the racing horses in England and America, and the word "thoroughbred" as applied fallaciously to the Short-horn cattle of America and England. There is only one thoroughbred animal in the world, that is the English racing horse. The same proposition holds good here and the use of the word "pedigree" is very unfortunate, as it is a word that is an impossibility in horticulture.

THE PEWAUKEE APPLE.

A. J. PHILIPS.

It was first discovered by George P. Peffer growing in the village of Pewaukee. From its surroundings and the appearance of the tree Mr. Peffer came to the conclusion that it was a seedling of the Duchess, fertilized by some winter variety perhaps the Jonathan or Northern Spy. It was first exhibited at a Wisconsin Winter Meeting in 1872, and by the vote of the society in 1873 it was placed on the commercial list of apples, where it remained until it was well tested all over our state, when it was dropped by the same voters, largely who placed it where it was. It has had a varied career. We older horticulturists had great faith in it for two reasons. First, its good quality and fine appearance of both tree and fruit; second, the environment that first brought it to our notice, having its first introduction at the hands of that noble man, George P. Peffer, a man I can truly say was as unselfish as any I ever knew. The writer had spent much time with him at his home, at many meetings in our state, also at meetings in Minnesota, in Iowa, in the city of Washington and I never heard him say a harmful word against any man engaged in the same business he was or do a selfish act in the way of refusing scions to anyone; he was broad, a fitting example for all of us. My first visit to him was to see the Pewaukee apple in his own cellar and see the tree in 1873. I had seen the fruit in Madison and fell in love with it. I bought and set fifty trees. I was not alone, others were captivated by it. Such men in our society as our tried and true friends, J. S. Stickney and A. G. Tuttle. Each bought and set one hundred trees of it. The latter in recommending it said during one of our sessions in the seventies that he believed it was our coming winter apple for it was as hardy as the Duchess and good in quality as the Rhode Island Greening. I have heretofore said that it was dropped from our lists after being tried but it never received its thorough Black Eye and it made Uncle Peffer almost cry. After one of our trying winters Tuttle found his trees all dead and after Mr. Stickney found that on his soil it would not hang to the tree long enough to mature, he discarded it. I showed the largest specimens of it at the old Cold Spring state fair that I ever saw, three of them weighed over a pound each and I am safe in saying that if Uncle Peffer

brought one of his Milwaukee German friends to my table to see those apples he brought over one hundred. It is still reported as doing well in a few places, in both Canada and the United States. When we decided in the early nineties to set a trial orchard in Marathon county for the benefit of planters all over Wisconsin, and more especially for the small farmers on the cut over lands in the northern part of the state, we appointed a committee of three of the men of the largest experience in apple growing in our state to select suitable varieties. I yet have their report and not one of the three named the Pewaukee. So I planted none there, though I planted some that have proved no better.

Gentlemen of the convention as circumstances prevent my being with you the first time in 22 years, I now leave the Pewaukee tree to your tender care and ask what will you do with it. I have introduced this subject as briefly as I could.

DISCUSSION.

Mr. Moyle: A gentleman just told me that the original Pewaukee tree is still alive and about ten inches in diameter, a very large tree, you see. It is down in Pewaukee where Mr. Peffer lived. I have been told that Mr. Peffer sowed the seed of the Duchess of Oldenberg, and from those seeds he grew the Pewaukee apple. Mr. Peffer was one of the forefathers of horticulture in our state; I never knew him, he passed away before my day. Now, there are none of us infallible, and our good old forefathers were enthusiastic seedling growers, and the result was that often apples were brought to the society and introduced and put upon the market as something remarkably hardy and the quality the best and they were going to make it possible for us to grow apples all over our state, and the Pewaukee was one of those apples that have been propagated extensively and planted and grown not only in our state, but in other states, and at the present time it seems a reaction has taken place and the horticultural press have taken up the matter and tell us the Pewaukee apple is no good and our good horticultural fathers had poor judgment; could not tell a good apple when they saw it, and in their enthusiasm they forced his apple upon us, and to-day it should be discarded, planted no more; that we have other varieties that are much

better and we are here this morning to discuss this matter and determine whether this judgment passed upon it is correct.

Now, I want to say this morning, that the Pewaukee apple in quality and the tree in productiveness is as good as any Wisconsin seedling we have, with one or two exceptions. Compared with the Northwestern Greening or the Wolf River, I give the Pewaukee the preference, remember, as to quality, productiveness and from a dollar and cents standpoint the Pewaukee apple will produce more market apples, bring more in the market for a certain number of years than either of these other two great Wisconsin seedlings, Northwestern, Greening or Wolf River. The Pewaukee is one of the most productive apples we have. I have seen barrels and barrels hanging on trees that were twelve, fourteen to fifteen years of age, in fact, it bears itself to death, that is the great fault of the Pewaukee apple, it is so productive. As to the hardiness of the tree, it cannot be called a hardy apple. It was introduced in this society as a hardy apple, they thought it was so because it was a seedling of the Duchess of Oldenberg, but in this state it has not proved so hardy as the Golden Russet in Racine county, so it cannot be recommended in Wisconsin from the standpoint of hardiness, but if you are growing for dollars and cents and have a soil that will color up the Pewaukee, the Pewaukee will color up and keep nice enough so it will be a profitable market apple. I do not grow it extensively in our locality, because we have better apples, but if I were going to plant out a large commercial orchard, I would not hesitate at all to plant largely of the Pewaukee apple. As to its keeping qualities, I should say that if the Pewaukee is picked when it is still somewhat green, it will keep as well as any apple, but if allowed to ripen on the tree and become mellow, it will not keep. So I would say that we should not discard the Pewaukee apple in localities where it succeeds.

Mr. Periam: I want to testify in relation to one point. I had the pleasure and the satisfaction of being very well acquainted with Mr. Peffer for a long series of years and if Mr. Peffer testified that that was a seedling, he was a man so thoroughly honest, so careful in his work, that if he said that that is a seedling of the Northwestern Greening or whatever it may be, it is a fact, and it must be accepted.

Mr. Sperbeck: As regards the Pewaukee apple, my experience with that has been this—the trees are too tender in our locality. In Southern Wisconsin and Northern Illinois I think they can grow nice apples. When I was at the meeting in Illinois they had some fine specimens, but with me the trees are not hardy enough, and as far as the keeping quality is concerned, I think it is fairly good. We believe that in Northern Wisconsin that it is not the apple that we should put out, and they stand no comparison with us with the Northwestern Greening for a commercial apple.

Mr. Foley: I cannot agree with my friend, Mr. Moyle. I cannot compare the Pewaukee at all with the Northwestern Greening. I think the Northwestern Greening is one of the finest apples we are propagating to-day in the Northwest. Now, I have grown the Pewaukee and several other varieties in the nursery row, and they are not hardy with me. I have a large orchard about six years old, and the Pewaukee is not hardy in the orchard, and I think in our locality the Northwestern Greening is far superior in both quality and hardiness.

Mr. Menn: I am speaking strictly for the western part of our state. I set my first Pewaukee trees in the spring of 1884 and 1885. The trees grew very nicely until they came into bearing; after bearing one or two crops they showed signs of failure, with the best care, and it was but a few years later that the trees were dead. Now, from that time on I never set another Pewaukee tree. They were productive at the time and the keeping qualities were very good, but, as Mr. Moyle has stated, making comparison with the Pewaukee and the Northwestern Greening, I cannot agree with Mr. Moyle; the Northwestern is far ahead in our section of the country of the Pewaukee. Now, I want to say that those trees that I set were set on very good apple soil, up on high ridges that we find in the western part of our state with the clay, gravel sub-soil underlaid with limestone, so there is no lack in fertility. I have also seen these trees grown on light soil near Sparta. In fact, two years ago while we were gathering fruit for St. Louis I came to an orchard on this light soil, where I found a Pewaukee tree that was loaded with as fine fruit as I had ever seen. I climbed into that tree and selected what I wanted. The tree appeared to be perfectly healthy at the

time. A year later the man that I got the apples from stopped me on the street in Sparta and accused me of climbing into this Pewaukee tree and killing the tree; the tree had died after that fruit had been picked. Now, I have observed that on other places in the western part of the state, that the tree is not hardy, and for that reason I would not recommend the tree for the western part of our state.

Mr. Marshall: I do not know anything of the hardiness, for or against the Pewaukee apple, but I don't think there is any question but what there is more money to be made off the Pewaukee apple in a section of country within a radius of ten miles around Milwaukee than all the other apples put together. I have driven through that country two or three times, gathering apples for Buffalo and St. Louis, and I do not think that that is an exaggeration.

The President: I wish to say this, that my experience with the Pewaukee apple is quite limited, it is merely observation; I do not grow it. The Pewaukee apple with us is not inclined to be very hardy, it blights somewhat. It raises good apples, and I believe, as Mr. Marshall has said, that there is a part of our state where the Pewaukee succeeds well and should be grown. I believe also that there are parts of the state where it does not do very well and does not live very long, and that it blights, and yet the question is, what shall we do with it. I believe we ought to retain it, with the understanding that there are certain sections in the state where you can grow it, and there are other sections where you cannot grow it successfully.

Mr. Toole: In my experience in collecting fruit I had a chance to see a great deal of it. We have in our country some people who would like a good chance to stand up here and champion the Pewaukee and others are ready to condemn it. As near as I can observe, the great trouble with it is—and that gives us this conflicting testimony—its peculiar liability to being infected with blight. Almost every year our Tallman Sweet has twig blight, and never hurts the tree, but it seems to me the blight is apt to strike the Pewaukee in the branches; you will find all at once the canker in the branches and crotches and away your tree goes; and perhaps a close study might reveal that some situations are not affected that way, but still those who have been around and have seen it

and have seen the way we get along with other trees, they naturally feel shy of planting that particular variety when they are safer with other kinds.

Mr. Kellogg: In the neighborhood of Milwaukee and around Pewaukee, where this apple originated, it does not make any difference what we decide to do with it, people down there will make their own decision. You cannot drive the Pewaukee apple out there with the State Society or Pomological Society or anything else, they are bound to have it there. But in comparing the Pewaukee with other seedlings, you must not lose sight of the fact that there is a certain latitude beyond which the Pewaukee will not succeed, compared with other varieties. We have yet to raise the Northwestern Greening in any manner to satisfy us as an orchard tree, but at the same time I do not feel like condemning the Northwestern Greening, and I believe it succeeds in the northern sections where the Pewaukee will not.

Prof. Hedrick: Prof. S. A. Beach, now at Ames, Iowa, unfortunately is not in the room. He has gotten out in the last few years a magnificent book on the apples of New York, in which he goes into the history as well as the description of all the varieties grown in that state. The Pewaukee is very largely grown in Northern New York, in the St. Lawrence valley and Champlain valley. In looking up the history of the apple, he wrote a number of men here in Wisconsin, I am not able to give you their names; I am not sure but the originator of the apple is one of them, and in his correspondence he got together information which led him to feel sure that the true parents of the Pewaukee—every apple must have two parents, of course—are the Duchess and the Blue Pearmain, both tree and fruit have characteristics of these two trees, and grown side by side, with the Duchess and Blue Pearmain, you will find it is a pretty fair cross between the two, its characteristics are intermediate between the two; in tree growth particularly it is very largely a Duchess, in the marking of the fruit, in color, it is very largely a Blue Pearmain, and Prof. Beach sets forth in this book I have mentioned, that in his opinion, after having studied all the evidence that he can get, that it is a cross between the Duchess and the Blue Pearmain. I do not know that this little history makes any difference as

to the value of the apple in your state, but I thought you might be interested in it.

Mr. Smith: I believe that Mr. Moyle's statement will appear rather contradictory. He said the Pewaukee bears itself to death in the orchard; they were all dead and gone before others, but he does not say what killed them in the orchard. Then later he says they are not hardy; then again, he said that if he would set an orchard he would set quite largely of the Pewaukee. I would like to have Mr. Moyle explain his position a little better; it will certainly show very contradictory statements in our report.

Mr. Moyle: I reasoned along this line—the Pewaukee will start very young and bear heavily and bear themselves to death. The vitality is weakened by bearing these heavy crops, but, on the other hand, during the life of this tree, it has yielded more and paid more than the other trees that are still in the orchard.

The President: I think, perhaps, we will not get any better conclusion than we have already arrived at, and I would like to know whether you want to take an expression of what we will do with that Pewaukee apple?

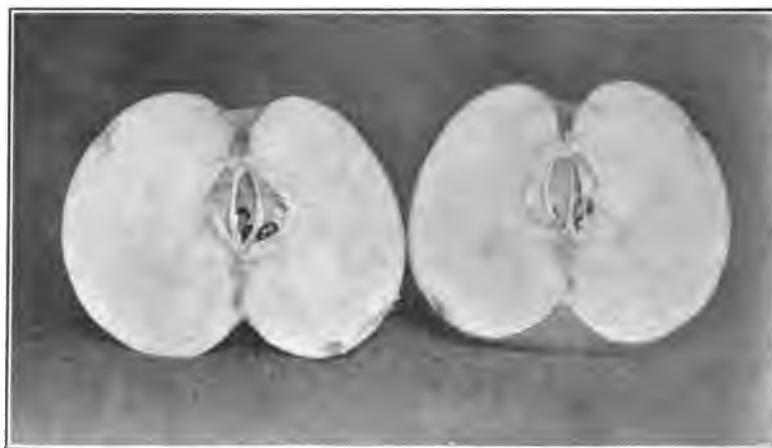
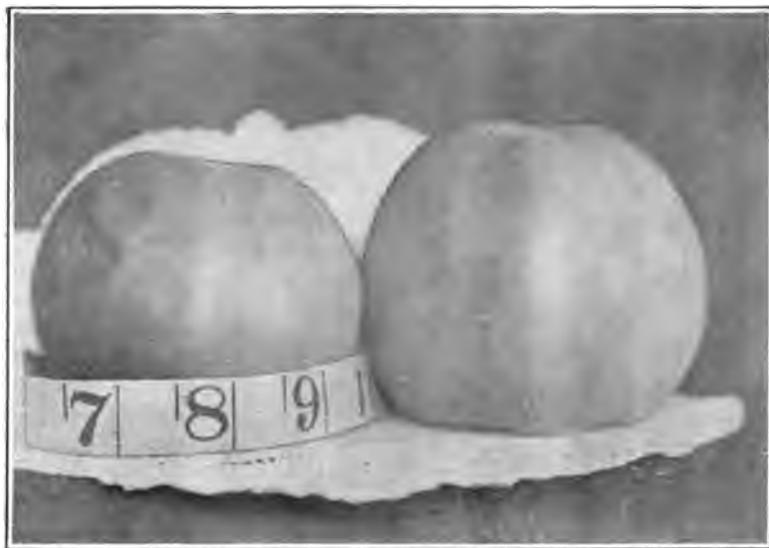
Mr. Kellogg: I would move that the expression be taken whether we shall retain the Pewaukee for certain sections of the state or not.

Mr. Marshall: We have an orchard committee, I think that perhaps it would be more proper that the matter be turned over to them and be more carefully considered than to be brought up in this way, before any expression is made.

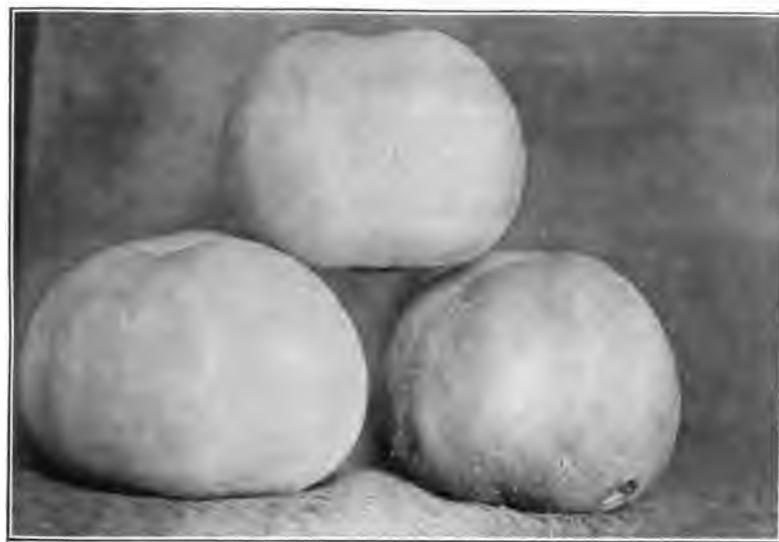
THE ZETTLE SEEDLING APPLES.

D. E. BINGHAM, Sturgeon Bay, Wis.

For about fifty years Mr. Joseph Zettle was a resident of a farm near Sturgeon Bay in Door county. From his ancestors in Switzerland he inherited an intense love for fruit trees. During his life he procured and planted every kind of fruit tree that



Lilly, one of the Zettle Seedlings.



Seedling Apple from Richland County, exhibited at State Fair, 1905, by John Reis, Ithaca, Wis.

he could learn about that he believed to be sufficiently hardy. He also grew many seedlings from which he selected the best and grafted into root sprouts and other trees planted in his orchard. Of all he fruited he regarded two varieties as quite superior to several thousand trees in his orchard. One of these by suggestion of Mr. Hatch he named the Bellflower as it is an apple of that type. This variety is a Duchess seedling probably crossed with Antonovka, several trees of which are in his orchard. In habit of growth the tree is perhaps more like the Antonovka, especially in its early and wonderful fruitage. In robust and sturdy parentage certainly no tree could boast of hardier ancestors. The fruit is large, yellow and about the same season as the Antonovka.

The other variety which Mr. Zettle esteemed most highly he named the Lily after one of his daughters. As a seedling this variety is certainly unique—its origin being a Duchess seedling; that is, the seed producing the Lily was taken from a tree that was itself a Duchess seedling. In fruit the Lily is rather larger than the Duchess with a smooth fine skin marked with stripes and splashes of red some what like the St. Lawrence which it resembles somewhat in shape. Possibly its parentage may include the St. Lawrence but the possibilities are greater for its being part Pewaukee of which there are many trees in Mr. Zettle's orchard near his Duchess. In quality the apple is of finer texture than the Duchess and a little later in season.

Perhaps right here is where your interest will begin to lag when you have learned that both of these are fall apples. And you may think that with the multitude of varieties we have of that season it is imposing on good natured but suffering horticulturists to ask them to accept two more fall seedlings from Door county. It is, however, at this point my enthusiasm begins and I ask your patient consideration of what I have to offer. My enthusiasm for this variety begins in the tree itself. Not only has it the splendid foliage of the Duchess, which is not surpassed by any known apple but its style of branching is far superior. There is a decided improvement in the number of limbs and a consequent increase in the fruiting surface. And above all it has feeding powers—a self hustling root power—if you will admit the expression that makes it live, grow and bear fruit as very few other kinds even approach. This tree in the

orchard can be highly appreciated when it stands up strong and vigorous while such kinds as Russets and Newell are broken with moderate crops and common summer winds. Indeed if there is any variety that is a full fledged discouragement in this regard it is the Newell, which in spite of training and pruning is always making a bad show in the orchard.

There is one point in apple culture upon which we all agree and that is hardiness. Another point I wish to make is that for hardiness the Duchess and its seedlings are among the hardiest known and for us in Wisconsin will make possible successful apple culture over a greater portion of the state than any other class of apples now known.

While these will be doubtless accepted as conclusive of these points I shall not urge the further point that we do well to bring these two varieties to the notice of the public that they may be more widely grown and enjoyed.

Our work in bringing out Duchess seedlings has gone perhaps far enough and in the production of more apples of that type we could not expect to add anything of value not now fully obtained. What we need now to do is to use these seedlings as the foundation stock upon which to grow the quality and keeping properties we so much need in our Wisconsin pomology. Right here our real work begins for apple culture progress. In the Lily we have the foundation that is the very acme of what the orchard tree should be. Now upon this foundation by systematic cross fertilization let new seedlings be produced of such apples as the Northern Spy, Jonathan, Newtown Pippin, Spitzemberg, etc. These apples of high quality and excellent keeping qualities would probably be sufficient to give character to the fruit while the tremendous individuality of the foundation tree would perhaps assert itself in the new seedling trees, to retain all its desirable characteristics. Of course we could not expect a blending of traits and a gradual modification of any one feature so that while one parent has a characteristic half as good as we want and the other quite as good as we wish the new fruit should possess this feature half way between. The new fruit would take its different traits wholly from one of its parents or so nearly so as to give rise to what is properly termed "*Unity of heridity.*"

Working with the law we could at once begin the work of putting excellent quality fruits upon the hardiest and best

trees now known. This ought to give results far quicker than could be hoped for in chance seedlings and selections of variations. But this is not the work for individuals. Life is too short for that. The fate of the Freeborn collection in Richland county demonstrates this. Mr. Peffer, Mr. Springer, Mr. Zettle and others, seedling advocates, have passed away. It is the work for young men.

While this work may be properly undertaken by our Experiment Station it is one in which our society should co-operate. Our Secretary is comparatively a young man, he is familiar with the work and methods of the Wisconsin Station, and is amply qualified for the work. Let us give him the authority and the funds to begin work. If you care to do this the firm of Hatch and Bingham will gladly send some Lily trees to begin with.

In closing let me urge upon you the importance of this work. Let us co-operate with the dean of the agricultural college who has so well served us, let us cherish the memory of our co-worker and friend Prof. Goff, and further let us encourage Prof. Sandsten in his work by letting him know that in this field of producing new varieties of apples we have a work worthy of his best efforts and one that will bring honor and profit to our state.

DISCUSSION.

Mr. Menn: How old is the original tree?

Mr. Bingham: I think Mr. Zettle has trees in his orchard of this variety that are perhaps eight or ten years old. If he were alive, we could get a history of his apples, but he left no record of the seedlings or the age of the original trees and it was impossible to get an exact age.

Mr. Menn: Does it blight?

Mr. Bingham: I have never seen any blight in the orchard.

Mr. Underwood: Mr. Bingham's paper brings something into my mind that may interest you. We are beginning to believe in our Minnesota society that our work has been falling down a little in the matter of these new seedlings, and we are going to try to mend our ways. Mr. Bingham's suggestion is a very good one and we are starting to work along a somewhat

similar line, however, with a little different method. You know we are offering a thousand dollars up there for a new winter seedling and the result has been that there are hundreds, I might say, of new seedlings being brought out every year, the same as you have in your own state, and exhibited at our annual meetings and at our state fairs, but there has been no methodical, systematic attempt made to record the experiments of these men who have given their time to it. There is the orchard of Mr. Peter M. Gideon and Mr. Dartt over in our state and of Mr. Terry, the plum enthusiast, down in Iowa, and Mr. Tuttle and a number of your men here. Now, in breeding stock they have what we know as herd books and individuals, which, carrying the analogy along into fruits would mean varieties, individuals which have made a record, are recorded there for future generations to refer to, and it seems to me as though we ought to have in each state some systematic effort to record these new varieties that come up, give their history, boil it down and put it into a convenient form for experimenters to have before them. In this way we could avoid this treadmill work, each new generation coming along and doing the same work over that their fathers had done before them. We have established up there this year what we call the Plant Breeders' Auxiliary to our society, having for its main object the recording of new apples as they come out, so that all members of the society may be able to have a concise record of what has been done in years past.

A Member: I understood the apples on the desk were grown on the farm adjoining Mr. Hatch's, and I would like to have a statement from Mr. Hatch as to whether he knows what is called the Hank's seedlings?

Mr. Hatch: Those trees were put out about forty years ago, about a half dozen trees. The man got the Duchess and some crab apples. The son lives on the farm and this tree stood where one of the original trees stood. Whether it was sprouted from the root or whether he planted a seedling the son does not know, but we know that it is a pretty fair apple of the Alexander type and that it is strictly hardy. The tree has never in its whole life been pruned or sprayed. It bears annual crops, if my memory serves me right it bore fifteen bushels this year and thirty bushels last year. I have had the most expert men, men of national reputation, down here, examine the fruit and they all

pronounce it a seedling, different from anything they have ever seen.

Mr. Burnham: It was suggested it was the King.

Mr. Hatch: No, I do not think it is the King at all. I would like to say one word in regard to the Freeborn seedlings and the importance of systematic recording of the work of the raising of seedlings as suggested by the gentleman from Minnesota. Mr. Freeborn raised a great many seedlings of seeds of different varieties and graded them according to the varieties that the seedling is obtained from, but when he died, the whole thing stopped right there, all his work was lost. If he had made any progress at all, it was lost at his death, so you see the importance of continuing right along. Now, in my opinion there are only two lines of progress that we, as orchardists, can make along the line of apple growing. One is in breeding from individual trees, something that was talked about last night, and that is an important thing. We have in our orchard one tree in particular of the McMahan that in speaking of the tree we always say, "Why, that good tree," and it is good, it always grows nicely and if there is any crop at all we always get a big crop off that tree, and I have a Golden Russet tree that we always speak of as the Golden Russet tree. Now, if we take scions off those trees and graft them and then get them to fruit and select the best of the lot, it seems to me as if there would be progress along that line of work, breeding from the individual, and then along the line suggested by the paper in breeding from the seedling, selecting the best seedling and continuing along that line, we can hope for progress I am sure, and this is practical. We cannot all be plant pollonizers and breeders along that scientific line, we do not have the time, and we do not all of us have the talent to do it and the opportunity to do it, but in these very lines we can do it and continue right straight along.

Mr. Goodman: You use a wrong expression; the one is selection, and the other is breeding, and that is the reason we got confused. You make selections from your trees and that is the word you want to use, we do not want to use the word "breeding" in that connection, but "selection" and continued selection. We get the wrong impression if the word "breeding" is used.

THE MONROE COUNTY SEEDLING.

J. J. MENN.

In the fall of 1904, the first week in October, while driving through the county in search for apples for our Wisconsin exhibit at St. Louis, I stopped at the farm of Cal Day, in town of Wellington, Monroe county, his farm and 10 acre orchard being located four (4) miles east of the Kickapoo river on top of a high ridge.

In going through the orchard with Mr. Day I found 50 per cent of his trees "Seedlings," the balance being top worked. The crop of apples being very good, but prices very low. Mr. Day had made no effort to sell his fruit and the result was that the ground under the trees was covered with rotting apples.

Being more interested in the seedlings than our standard varieties, my eyes were constantly on the seedling trees that he had pointed out to me, until we came to a tree where at least two bushels of the largest and finest apples seen in the orchard were on the ground, some were still on the trees.

I asked what have you here? He said this is a seedling of the Duchess, it is the best apple and tree I have in the orchard, I have only one more top worked tree of this variety. The trees bear a good crop every year.

I have never seen signs of blossom or twig blight.

Our cold winters don't seem to injure the trees. I have been on this farm since 1856.

Planted my first seeds that fall, which I brought with me from the state of New York, have been experimenting in root grafting and top working, cross pollonization ever since, in hopes of growing some winter apples, superior to what we have.

This apple is far superior to its parent "the Duchess" in size, quality and keeping quality.

I asked Mr. Day to give me the history of the tree, which he cheerfully did.

He said in the fall of 1883, I had some choice Duchess trees upon which the Utter Red had been grafted, both the Duchess and Utter Red bore heavily that fall.

I picked a lot of these Duchess and sun dried them, saved the seeds, planted them in a row that fall in the garden, a few years later transplanted these seedlings in the orchard.

In the fall of 1890 one of these trees bore two apples larger and finer than had ever before been seen in my orchard.

Ripening the last of September, the following spring, I cut a few scions and grafted on a small seedling, you see the union is perfect, after this I never cut any more scions from these trees. I neglected to propagate from that time on, am getting too old to do much more in this line.

If you think the apple worthy of propagation and can get a little out of it for me, do so, I leave it with you.

I examined both trees and found them one of the finest orchard trees I have seen. Leaves more pointed than Duchess and not quite so dark green. Bark smooth, no signs of blight have ever been noticed.

The original tree is about 18 feet high and 8 inches in diameter.

The fruit is all large, averaging in size with the "McMahan" fruit, large, roundish, streaked yellow and red, flesh white, juicy and a very good cooking and canning apple, also a good eating apple. Season September 15 to November 15.

This in brief is the history of this seedling tree. I shipped some of these seedling apples to St. Louis and requested Mr. A. A. Parsons, superintendent of our Wisconsin Fruit Exhibit, to show Prof. Taft, who had charge of the judging, to pass on the seedling; he did so. In his reply he said, a very promising new variety, propagate as fast as possible.

In a letter from Mr. Parsons, dated November 17, he says, that seedling is here yet. Now if this seedling is hardy and prolific, it is a glorious thing beyond price.

I picked some of these seedlings last fall, shortly before our state fair and sent them with others to the fair, for our society exhibit in charge of Mr. Cranefield, our Secretary. There Prof. Green of the Minnesota society saw the fruit, he wrote me requesting to give him the history, which I did, I also mailed him one apple.

His reply is as follows:

Mr. J. J. Menn:—Yours of September 16th at hand and also seedling apple, which you were so good as to send on. I took this fruit to the American Pomological Society and it was favorably commented on by a large number of prominent pomologists. I wish I had had a full plate of it as it would then have attracted more attention. I regard it as a fruit of very ex-

ceptional and high value, and if the tree is healthy, hardy and productive, I think it will be a very important addition to our list of cultivated fruits. I shall include a description of the variety in my report to the American Pomological Society.

Yours very truly,

SAMUEL GREENE.

St Anthony Park, Minn.

Geo. J. Kellogg of Lake Mills called on me last fall and after he had seen the fruit and sampled it, pronounced it one of the finest Duchess seedlings he had seen.

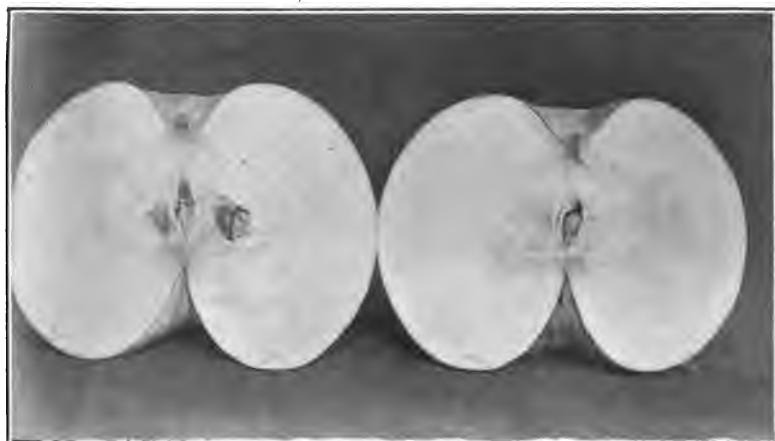
It seems too bad that this seedling was not discovered at the time of its first fruiting, if it had, many trees would now be in bearing this variety.

I would suggest that our society take up this seedling question. Many valuable seedling trees are growing all over the apple growing sections of our state, and unless we make a search for them, they will never be known.

A small amount of our funds expended for this purpose, would certainly bring good results for our state and the Northwest.

DISCUSSION.

Mr. Menn: I wish to state that I have no fruit here this morning. I had packed some, with the intention of sending it to cold storage after our state fair, last fall. I did so, but was unable to find storage at the time, and not until about two or three weeks later, and the weather being so warm during the month of October, it was a little bit too late to send them. For that reason I have no fruit here. I packed some away in the cellar, but the fruit did not keep until this time. I would state, though, that I packed some of the Wealthy and some of the McMahan at the same time, and in the same barrel and both the other varieties did not keep much better than this fruit did, the cellar being too warm. The tree, as I found it growing, is in an old blackberry patch; it had been cultivated for some time, but now had grown up to grass again. There were no signs of blight, as I stated in the paper, although there are a good many trees surrounding it that had



Duchess Seedling exhibited at State Fair, 1905, by J. J. Menn, Norwalk, Wis.

blighted to death. It shows the tree is almost immune. I have some of the wood and if any of you wish to examine it, you can do so. It seems to me, although this is a fall variety, it is a very important addition to our tree list as long as it is almost blight proof and an annual bearer, the quality being very good, and I think it is well for us as a society to look a little more after the seedlings of our state.

The Secretary: There is very little I can say on the subject, except to emphasize what Mr. Menn said. The apple of the Duchess seedling was shown at the state fair, last fall, and it attracted great attention. While I was in some doubt as to whether the Sauk county apple was a seedling, I am in no doubt in regard to this, because there is nothing else in that family of apples that at all resembles it. The fruit that was shown is nearly as large again as the average Duchess, a later apple, it keeps well and while it is a fall apple, I think it will be a valuable addition to our list of fall apples. In color and form it resembles the Duchess; it resembles it in form more than in color. It is undoubtedly of the Duchess family. When I said what I did a moment ago, I had in mind that it was not any of the other Russian apples that have been grown in Wisconsin. It is not the Duchess, it is not any other of the Russian apples, it is undoubtedly a seedling and later than the Morgan, which is a seedling of the Duchess, much later than the Duchess, about in the season of the Wealthy, or possibly a little earlier. I should say that it is an apple that we need to give a great deal of attention to, and as Mr. Menn says, I think we cannot give too much attention to the seedlings. They are found to come rarely by processes of hybridization, they are usually found in the fence corner. That is not the history of the Duchess, but that is the history of a great many of our apples.

Mr. Bingham: I would like to have Mr. Cranefield state to the society whether the seedlings that I spoke about attracted any attention in Milwaukee at the state fair. We sent them down there.

The Secretary: The Zettle seedlings did attract considerable attention from fruit men, not so much as the Duchess seedling shown by Mr. Menn, for the reason that that was possibly a more conspicuous or more showy apple. Your Sturgeon Bay seedlings are not as brightly colored as the

other, but the Zettle seedling did attract considerable attention. There were one or two of undoubted merit, one called the "Lily," and another that attracted a great deal of attention, and I wish to urge upon the members here present the desirability of sending fruit to the state fairs. I expect our exhibit there will now be an annual event. I almost implored people to send apple seedlings or anything else to the state exhibit, but we got very few, Mr. Menn responded, and Mr. Bingham, and some others. There is your chance. You cannot show your fall seedlings at the winter meeting, you can show them at the state fair.

Mr. Toole: I think our Secretary asked for an expression of opinion in regard to the value of the Milwaukee exhibit to the society. I for one, think a great deal of it, and hope it will be continued. We saw many good reasons why we should have it, one seemed to be that it formed the headquarters for horticulturists to get together. Not only were new seedlings brought forward for examination and certain varieties were brought there for naming, shrubs, etc., to be identified, and a great deal of information was brought out in that way, and I do not think that I need to say that I hope our Secretary will continue that; I am quite sure the encouragement he got there from his own observation will make it a permanent feature of this society's work.

CULTIVATION AND COVER CROPS.

PROF. N. P. HEDRICK, Geneva, N. Y.

Cultivation is as old as agriculture. It probably began in the garden which the Almighty gave Adam to tend. The very existence of domesticated plants depends upon cultivation. All man's care of plants centers around one great object—to give them more food. We cultivate to make available the food stored in the soil; by means of fertilizers we add food to the soil; we water and irrigate to bring food into solution; we thin that the remaining plants may have more food; we destroy the weeds that rob our plants of food; and we even

cut away parts of the plant, pruning, that the remaining parts may have more food. Of all these operations practiced by tillers of the soil, expressive phrase, the world over, shall we not put cultivation first? The Biblical injunction is to "dig and dung," and dig is first. First of the processes which have helped to domesticate and ameliorate plants, and first of the means we now have of sustaining and augmenting their value.

For some reason it has taken centuries for the fruit-grower to come to any degree of appreciation of the value of cultivation and not one in ten of our fruit-growers rightfully value it at the present advanced stage of agriculture. In no other phase of agriculture shall we find cultivation held of so great importance as in the branches of horticulture other than fruit growing. Could one imagine a sane body of market gardeners discussing the relative values of cultivation or no cultivation, or tillage versus sod-mulch, for onions or cabbage? Yet onions and cabbage differ but little in their feeding habits from apples and pears. That miracle of miracles, the bringing forth from a pot of soil, a plant which weighs more than the earth from which it came, performed in countless numbers by the florist, near neighbor to the fruit-grower, could never be done without daily digging about the plant.

And so, forsooth, when men in our profession should be interested in the thousand and one new problems in pomology we are still thrashing over the pre-historic matter of orchard cultivation and this leads me to say that pomology as it now is, is too narrow. For most part it consists of the description and classification of fruits with some attention to orchard operations, of which cultivation seems prominent now. With the exception of the advance in spraying and in cross-pollination, we are much where we were a century ago so far as growing fruit is concerned. We need to discuss broader questions in pomology. We should be past the kindergarten subject, cultivation. Before us are the great problems of plant life—how plants grow, how they feed, means of improving them, and the whole great subject of reproduction with its manifold problems of bud-formation, bud-control, setting and dropping of fruit, development of fruit and the other interrelationships of the sexes.

But I must hasten to a discussion of cultivation itself, though, in truth to say, it has received so large a share of at-

tention at horticultural meetings of late that I can give you but little that is new on the subject and fear that I can do little more than reiterate again and again to you its importance. The effects of tillage on the soil and on plant growth are known to all. Nor need I go into details as to methods and implements as they must vary with every condition and hence with nearly every man. Beside the necessity of cultivation, however, I must urge judicious cultivation for there can be too much of a good thing and some soils are damaged by over cultivation.

In general, the soil needs each year a thorough turning up in the spring with a plow and a shaking out now and then through the growing season with the cultivator. The aim of such tillage is to let in sunshine and air, thereby furnishing life-giving oxygen to the roots and enabling the myriads of bacteria to live and work; to conserve moisture; to unlock the store rooms of potash and phosphoric acid; and to kill weeds. The last purpose, killing weeds, is in reality the least in importance though many think of it as the sole aim of the operation. One can almost say that weeds have a use, in that as we kill them with the cultivator we serve the other ends named. Certain it is that they serve as grindstones to sharpen our wits in this matter of tillage.

A few more practical suggestions are: begin plowing as soon as the soil can be worked in the spring; cultivate at intervals of a week or ten days until mid-summer; stop when the trees have made sufficient growth otherwise the wood may be soft and unripe for winter; cultivate in such a way, for most part, that the soil is left level. It requires some skill to cultivate a clay soil well and the chief item is that the work be done at exactly the right time. There is a time between wet and dry on clay soils when the clods break and crumble. A working at this particular stage will save half the labor required at a less opportune time. Clay soil is often worked until it is too fine and when the rain comes it cements and packs and the condition is coarser than at the beginning.

The implements should be adapted to the soil and to the work. There are now innumerable good tools and one can take his choice between various clod-crushers, harrows, cutaways, weeders and so on. Tools with high handles, levers, and wheels should be avoided for orchard work. Harnesses

should be such that there are few projecting parts and the orchard whiffle-tree will save barking the trunks.

We come now to that much discussed question, cultivation *versus* the grass mulch.

Periodically the horticultural world is startled with some new orchard treatment which promises to revolutionize current methods. Many of these new systems may be likened to the health fads which are sprung now and then on suffering humanity. The "water cures," the "back to nature" treatment, the vegetarian fad, have their parallels in horticulture. It may be that all contain the germs of truth. But fads are likely to be one-sided and to be heralded as "cure-alls" when they cure but one of many troubles. There are now several fads before the fruit-growers of the country which have in them. In the writer's opinion, possibilities of doing far more than good.

The fad in full swing now, the country over, is the so-called Hitchings method of grass-mulching apple orchards in place of cultivating them.

There is nothing new in the Hitchings system of grass-mulching orchards. At least twice before in the past century it has had a brief run of popularity. The present revival of grass-mulching orchards was started in New York, where the orchard of Grant Hitchings, under the system which bears his name, seemed to be exceptionally thrifty and productive of apples of high quality and of high color. Young trees, uncultivated and grown with a grass mulch, came in bearing much earlier than they usually do under current methods of orchard treatment. It is claimed, too, that grass-mulching is cheaper than clean cultivation. In Mr. Hitchings' orchard, the grass, supposedly blue grass, is cut several times during the season and thrown under the trees, where it is supposed to add humus and fertility to the soil and to aid the soil in retaining moisture. In this orchard grass-mulching is certainly a success.

Grass-mulching, in lieu of cultivation, may succeed in some soils, but cannot in all nor on the average soil. Deep, rich, heavy soils may grow two crops—grass and apples—but other soils will not. Again, it may be good practice to grass-mulch steep side hills or lands that cannot be easily cultivated. Under most conditions it will be found in the

long run that the grass-mulch system will diminish the growth of trees, weaken their vitality, make them more susceptible to droughts by enticing the apple rootlets to the surface; the grass will furnish hiding and breeding places for insects, fungi and vermin, and the store of plant food in the soil will be more quickly used up in the grass-mulched orchards than in the cultivated ones. Not only are the reason and the accumulated experience of apple growers against grass-mulching as a general practice, but such direct experiments as have been consistently carried out are against it.

The most complete and the best planned experiments that have come to the knowledge of the writer are those of the Woburn experimental fruit farm, conducted by the Duke of Bedford and Spencer U. Pickering in England. It is true that English and American conditions are quite different, but the relations of the two plants, grass and apple, should not be strikingly different in two sets of conditions. Their behavior should be relatively the same. The conclusion of these English experimenters should be of value to Americans. Their experiments have been carried on without interruption for the last ten years, and seem to prove that not only the evil effects enumerated above are brought about, but that grass is actively poisonous to apple trees. The following, taken from the introduction of their third report, gives the gist of their work:

“As to the general effect produced by grass on young apple trees the results of the last few years have brought forward nothing which can in any way modify our previous conclusions as to the intensely deleterious nature of this effect, and we can only repeat that no ordinary form of ill treatment—including even the combination of bad planting, growth of weeds and total neglect—is so harmful to the trees as growing grass round them.” * * * “The evidence which we shall bring forward will, we believe, be sufficient to dispose of the views that the grass effect is due to an interference with either the food supply, water supply or the air supply of the tree, and that it must in all probability be attributed to the action of some product, direct or indirect, of grass growth, which exercises an actively poisonous effect on the roots of the tree.”

And now in concluding this matter of cultivating the orchard. It seems to me that its importance must be known to

all. In horticultural meetings, in experiment station bulletins and in the horticultural press it has been urged year in and year out for a half century. It has been making of the great commercial orchards and its lack is the curse of the farm orchard. The grass-mulch heresy of Mr. Stringfellow and of my friend Mr. Hitchings, must not offset the good cultivation teachings. High cultivation has brought success in the past and it will in the future. In the words of J. H. Hale, the great peach grower, "culture, culture, culture, is the sure road to success while any other scheme of handling the orchard is nearly sure to lead the other way."

I want now to take up the second part of my subject, that of cover crops.

The relations which plants bear to their physical conditions, as soil, heat, moisture, and the like, are well understood in the main. Agriculture is and ever has been concerned with these relations. Practically all of the operations of the husbandman are efforts to help plants in their struggle against the circumstances of environment. When physical conditions are prejudicial, the life of the plant is a prolonged struggle against circumstances to which it may succumb, or under which attain a profitless maturity.

But plants are influenced by other factors than those of their physical environment. They have inter-relations between themselves upon which often depend their best development. Agriculture has neglected these relationships of plants to each other and has devoted itself almost entirely to plants and their environment. The agriculturist, for most part, has looked upon plants as passive, unchangeable organisms to which it was his business only to supply certain definite external conditions as food, moisture, and a foothold.

In this connection I may remind you that a generation ago it was the fond dream of the chemist and the agriculturist that an exact analysis of the soil, followed by a generous supply of any lacking elements, would result in fruitful harvests. I need not tell you that this dream has not been realized. To the contrary, we are depending less and less upon analyses of soils, and more and more upon a knowledge of plants, and especially of their life histories, as manifested in their needs, habits and relations. This is but one of the many illustrations

of how, consciously or not, we are being led to a new conception of plants, of how we are coming to look upon them as plastic organisms capable of remodeling in all their parts and of how the agriculturist must regulate all of the conditions of plant life, external and internal, if he is to realize as completely as possible the ends for which he cultivates.

What has this to do with fruit growing? The answer is that through a study of their relationships we can better determine what the vital necessities of cultivated plants are. In nature plants form communities because their necessities are the same. They are forced by their needs into companionship. So it comes that widely different species of plants often thrive side by side.

Thus, a knowledge of the association of cultivated plants, of the species and varieties that thrive side by side, would throw new light on the inter-relations of climates and soils with fruit growing. Note how the various communities formed by wild life characterize soils and climates, not alone of zones and countries, but of townships, localities, and even farms.

"Theories are fascinating," you say. "In what direction will a knowledge of horticultural floras be of advantage to fruit growing?" The catalogue of fruits mentioned could be made to show the variations of types in the regions already created; the locations of dominance of the various fruits and their varieties; locations of greatest size, highest color, best quality, and relative stability for all varieties; the longevity of individuals and of varieties in different regions; and a classification of varieties as to their likes and dislikes for various soils. A survey of horticultural regions along these lines would enable the fruit grower to specialize more closely and to plant and market his fruit to better advantage. There is no phase of horticulture of more vital importance at the present time with the keen competition that exists between different fruit regions, than the adaption of fruits and their varieties to geographical and local conditions. There should be horticultural floras established to show these adaptations.

The effects of crops and crop residues on the soil is another of the relationships of plants which imperatively demands attention. Plant life constantly changes the soil. A species may thus transform the soil favorably or unfavorably to itself as a

succeeding crop, or favorably or unfavorably to other species that may follow. Thus, a peach tree planted in the place of a perfectly healthy peach tree, ordinarily does not thrive. But few farm or garden crops grow well, succeeding themselves. In rotating farm crops, certain ones will not follow others advantageously, no matter how abundant the food supply may be. Our knowledge of these relationships is very vague and as the science of agriculture progresses, we must come to understand them better.

We do not know, for instance, to the satisfaction of all, what causes "sick" or "over-cropped" soils; or why it is that certain plants "exhaust" the soil for certain other plants; why fruit trees and some other crops do not thrive on newly cleared land following certain timbers, as the walnut and butternut; why rye grass, some of the Erigerons and some of the Vetches, as the tare, "poison" wheat. Thistles are said to "poison" oats; Euphorbias kill flax; members of the genus *Inula* are thought to be death to carrots; the peach and potato do not consort without mutual injury. We lay these antipathies to competition for food, moisture and air, but every observant cultivator knows that there are other factors causing such uncongenial relations of plants.

Nearly a century ago DeCandolle expounded his "excretory theory" to explain these incompatibilities. The "excretory theory" is now disproved of by botanists, but the above facts, which, in the main, gave rise to it, are still unexplained. Plants may not excrete poisons, but may they not in some way leave residues injurious to other plants? At any rate, we are not as yet able to wholly explain the facts which give rise to DeCandolle's theory.

Rotation of crops is a vital question in the agriculture of many countries. It is almost wholly a problem in the relationships of plants. The practice had its beginning in DeCandolle's theory that the residues left in the ground by plants were beneficial or detrimental to succeeding crops. The behavior of crops following clover was the chief fact upon which his "excretory theory" and the early systems of rotation were based. Until the discovery of the symbiosis of bacteria and the legumes, it was held that rotation was entirely a matter of soil and of food. Knowledge of the association maintained between bacteria and

members of the clover family has shed more light on the rotation of crops. May not other relationships be discovered which still further illuminate the now dogmatic practice of rotating crops?

Other relationships are those in which countless numbers of tiny plants, bacteria, exercise their role as helpers or destroyers of the plants we cultivate. We were once taught to think that all good bacteria were dead bacteria. But now we know that some of these wonder-working organisms are our best friends; that they not only aid in making good many of the products of the farm; but they make fertility, soil itself; in fact, are indispensable in the making of a farm. Each of the many kinds of bacteria has its special activities and of these we are especially interested in those which inhabit the tubercles on the roots of leguminous plants.

About these cluster a number of all-important relationships of the farm and orchard, as: the rotation of leguminous crops with others; the growing of clovers with grasses and grains; and the use of legumes as cover crops. Until recently our knowledge concerning these relationships was wholly empirical and we are yet far from understanding them well. When we remember that twenty years ago we did not even know of this partnership of bacteria and legumes—why, for example, clover fertilized soils, and that every year our knowledge of these relationships greatly increases, we can appreciate the possible value of future discoveries.

This somewhat lengthy introduction brings me, now, to my subject the relationships of catch crops and cover crops to orchard trees. Some observations and experiences of my own may be given here.

In 1897 the writer's attention was called to the behavior of peach trees in orchards where catch crops were always grown. The little town of Brigham City, Utah, is situated in a cove of the Wasatch Mountains. It has long been noted for its peaches. The soil is a decomposed rock, rich but very shallow, the loose rock, still decomposing, is within a foot of the surface. The peach land in the locality is limited in area, is under irrigation, and therefore valuable, so that the trees are always set closely and catch crops of vegetables and small fruits are grown between the rows. In this shallow soil the contact of roots between trees and crops of necessity is intimate. A better opportunity for

studying the relationship of various plants with the peach could hardly be found. The effects of the intermingling were most pronounced. One could almost tell from the color of the foliage or the amount of growth, or the maturity of fruit or leaf, what catch crop was being grown in the different peach orchards. Each of the families represented by the inter-crops seemed to have a distinct effect. Under irrigation, moisture had nothing to do with the differences. Competition for food must have been a factor, yet the peach requires but little food, the soil was rich, high tillage was given, and it seemed to me that the differences arose very largely from factors other than competition for food. Visits to the Brigham City orchards suggested experiments on the relationships of plants.

Opportunity did not offer to attempt these until two years ago, when a start was made on the grounds of the Michigan Agricultural College. Field experiments with various crops were tried in a young apple orchard; but little came of them. The soil was deep giving a root run for all plants; moisture conditions could not be controlled; the temperature was far less uniform than in Utah; and the apple seemed less sensitive to the companionship of other plants than the peach. Two years ago at the Michigan Agricultural College pot experiments with the peach and with various catch crops were begun. The first season's results are of interest.

Very briefly, we grew in large pots a number of plants representing several widely different families in intimate contact with peach trees. The experiment demonstrated pretty conclusively that the peach likes the company of some plants and just as heartily dislikes that of others. The fact came out again that the peach and the potato will not take their food together in peace. For myself, I feel pretty sure that if these two plants are in intimate contact the results will be disastrous and most so to the peach. Neither do I think the matter is wholly one of food and drink but think that the trouble is much more deep-seated, that in some way the one is poisonous to the other. Much ill-feeling seemed to be manifested between the grains, wheat and rye, and the peach; the disagreement was not so marked when members of the cabbage family and the peach came together, while the members of the pea and clover family were beneficial companions to the peach.

It is not supposed that other plants can make use of the nitrogen prepared for the roots on living legumes by bacteria, but the behavior of the peach and the clover in the pots in this experiment indicates that such may be the case. The larger growth when growing with clover than when growing alone seems to indicate that the peach roots absorb some of the food prepared by the tiny partners of the clover, or, that the clovers give up some of their prepared food to the peach.

The practical import of the above experiment is that at least the peach among our fruits wants her food and drink alone for most part. We except, of course, the clovers from the non-desirable plant companions of the peach. I believe that a similar state of affairs would be found to exist between other orchard trees and the various families of cultivated plants. This means that catch crops are not overly desirable for an orchard if the roots are to come in contact with those of the orchard trees.

The above experiment has an important bearing on the much mooted question of cover crops. Cover crops in an orchard serve three purposes. They protect the soil, enrich and hasten the seasonal maturity of the trees. We are usually advised to grow a crop which serves the three uses, but there may be objections to the triple purpose cover crop. Thus, one of the most apparent relations between the peach and the plants grown with it is that some of the herbaceous species check the growth of the trees, causing them to ripen their wood, and some do not; but, to the contrary, extend the growing season of the young trees. We found that long before there was sufficient frost to injure peach foliage, the seedling peaches grown in pots with oats, rye, blue grass, mustard, potatoes, or any one of the several other species, had dropped their leaves, and the trees were ready for winter. Not so with the young trees grown in pots with crimson clover, peas and beans. Until a severe frost on the night of November 1st, the leaves remained on these trees green and luxuriant. So far as ripening of wood is concerned, they are totally unprepared for winter.

An examination of the root growth in the various pots was interesting. The root systems of the trees and the plants in the first-named group were not at all intimate. The roots of the plants scarcely came in contact with each other, but the roots of the clover and the peach were so intermingled that they were matted together and could not be easily separated. The practical side of all this is that legumes are not good cover crops when

the object is to cause trees to ripen their wood. I believe that peach trees would suffer more in a cold winter with a legume as a cover crop than without a catch crop of any kind. The experience of Michigan peach growers confirms this opinion. For a cover crop to hasten the maturity of the tree, instead of a legume, one of the cereals, as oats or rye, would certainly answer the purpose much better.

In conclusion I must express the fear that I have given you little that is tangible in regard to cover and catch crops. My apology is that the practical side of the question has advanced as far as it can until more scientific work is done and that all that is practical is common knowledge, or should be, with every up-to-date fruit grower. That I have not given you more regarding the scientific side of the problem, my excuse must be that the field here is vast and vague. But surely we are not to leave it unexplored just because it is vast and vague. The little incursions we have made into the region but faintly indicates what lies therein. We have not touched the boundaries, if, indeed, there be boundaries. Much of what can now be seen is meaningless for we are not yet ready to ask intelligent questions. But the task of explorations need not appall us. That man has wrung from nature many of her secrets, impels us to become still more potent in our sway of her forces. But dominion in nature's realm is not given us. We must gain it by conquest. And so I leave the problems I have tried to lay before you—subjects for future conquests.

DISCUSSION.

Mr. Brackett: Would not your theory of the grass mulch on your peach trees which you stated would induce ripening before frost and hardening of the wood, would not that same theory work on the apple tree in a northern climate where young trees are liable to have late growth?

Prof. Hedrick: Certainly it would, but it would somewhat weaken the vitality of the trees, but if it were absolutely necessary to ripen the wood, to secure a good growth, it certainly would help. You would find that your trees would blossom and leaf out at least a week later in the late spring. I do not know of the advantages of the grass mulch myself, I do not claim

there are no advantages in the grass mulch, but it is true that trees mature their wood earlier with the grass mulch and also are later in coming into blossom.

Mr. Brackett: In our location west of Minneapolis nine tenths of the orchards planted there are grown with the grass mulch. I was employed two years ago to gather fruit for the St. Louis Exposition, and I visited every orchard in our country up there and I found that the orchards that were seeded down to grass, were the orchards that were bringing the money and they were successful and were not winter killing or blighting as early as the orchards that were thoroughly cultivated. I remember one case particularly of two orchards, one on each side of the road, standing right opposite each other on the same kind of ground, one orchard was thoroughly cultivated and blighted and killed to the ground, it was entirely worthless, while the other that had been seeded down to grass and had been for thirty-five years, the blight never touched it. Every year that orchard brings a good crop of apples. They have this year an off year with us on apples up there, but that one acre of ninety-four or ninety-five trees has brought in a revenue of \$240, while the other orchard, which is in thorough cultivation, has not brought in anything at all.

Mr. Underwood: How about plums?

Prof. Hedrick: We have the same effect as upon the peaches.

Mr. Underwood. And potatoes?

Prof. Hedrick: I am not sure about potatoes. From recent observations published by the United States Department of Agriculture I suspect the potato is not a tremendously desirable companion crop for any crop where the roots come in contact.

Mr. Burnham: I would like to ask the professor, as a compromise between the two, grass mulch and cultivation, how would it do to cultivate, say until July, as long as you wish, and then sow winter rye?

Prof. Hedrick: The thing to do. It is a good cover crop. I think the large orchardists in commercial orchards all over the country very largely practice that, unless there are conditions which make cultivation almost impossible, and there are those conditions, and there are the conditions in the northern climates, as the gentleman has just said, where you want the trees to mature their wood rapidly, and certainly there are cases where the grass mulch may be all right.

Mr. Foley: Would you recommend growing corn in a young orchard?

Prof. Hedrick: I think corn is the most desirable crop of any to be grown in young orchards. Corn and peas; beans also are desirable.

Mr. Kellogg: In cereals, is winter rye as desirable a crop where the party wishes to cultivate next year, as one of the cereals that would be killed by the winter, say oats or barley?

Prof. Hedrick: Well, if you begin your cultivation by plowing under, it makes little difference. If you are not going to plow, but simply cultivate, then the oats or barley would be the better cover crop than winter rye.

Mr. Kellogg: Would buckwheat be all right?

Prof. Hedrick: No, I do not like buckwheat for a cover crop. It is apt to give you a sour soil, so that I would not advise buckwheat at all. Wheat makes a fairly desirable cover crop. The practice in western New York and the practice for a greater part of southern Michigan, I think with apples at any rate and some other crops, is to use a clover like plant once in about two or three years and then use oats or rye or grain crop for two or three years, but all that depends on the amount of nitrogen in the soil.

Mr. Kellogg: Do you have any trouble with mice?

Prof. Hedrick: Yes, all over the country. I expect that every young tree that is set out in New York is protected through the winter against mice.

Mr. Kellogg: What protection are you using against mice?

Prof. Hedrick: A protector that is made in Syracuse, New York; I have forgotten the name of the article, but it is simply a cylinder of wire, small mesh wire, about 15 inches wide, similar to the wire mesh in a window screen, that is put about the trees. It costs about one or two cents for each tree, probably less, and universally throughout New York this wire mesh is used to protect the trees. We formerly used wood veneer and coarse paper and various other articles, but I believe this wire mesh is now used universally.

Mr. Kellogg: What objections are there to the veneer and paper?

Prof. Hedrick: Well, they decay quickly and mice sometimes get in, and another reason, they make the wood of the tree more tender than the wire mesh. That wire mesh lets in sun and

wind and is better for the tree. There is no great objection to the wood veneer, it is cheaper, but the wire mesh is much better.

Mr. Menn: What is the price?

Prof. Hedrick: I think \$10 or \$12 a thousand.

Mr. Bingham: I have used the wood protector and found I had much more trouble with the mice than without.

Prof. Hedrick: You will find the wire mesh, if you get it at a reasonable price, the best protection. It is put an inch or two into the ground.

A Member: What would be the harm in leaving the wire mesh in during the summer?

Prof. Hedrick: No harm except in cultivating you are continually catching onto the wire mesh, and it is a small matter to pick these up in the spring and put them on in the fall.

Mr. Brackett: I would like to know if in a cold climate it is not advisable to have trees root deep, that is, anything that will induce them to root deep is a good thing?

Prof. Hedrick: Tip-top; in any climate it is.

Mr. Brackett: Don't you think grass grown around trees, taking the moisture from the top of the ground, and also occupying the top of the ground as a surface, would induce deep rooting?

Prof. Hedrick: No, I think just the other way; I think it induces the roots to come to the surface. Without going into the philosophy as to why they do it, experience in plowing up grass orchards will show you the roots of the apple trees are right close up to the surface. In plowing each spring, you will find they are further down. Grass mulch brings them up to the surface. That is a fact any man can demonstrate.

Mr. Street: Is it best to plow every spring from the time the orchard is set, to keep that up, or to cultivate after the trees get two or three years old to practice cultivation without the plowing?

Prof. Hedrick: Well, I suspect there are many conditions in which you might omit the plowing now and then, but I should certainly recommend an occasional plowing up in the spring. In Michigan Horticultural College in which an old orchard was proved to be fairly profitable, we plowed every other year and cultivated every year and sowed a cover crop.

Mr. Kellogg: Would you recommend a well rotted manure in place of a cover crop?

Prof. Hedrick: It will take its place, but it is more expensive.

Mr. Kellogg: Will the added fertility pay for the extra expenditure?

Prof. Hedrick: I doubt it. I think the cost of hauling out the manure would be too great. If you have abundant manure it is a good thing for the orchard; it depends very largely on the soil.

A Member: What is the result say of ten year's cultivation in an orchard, no cover crop and plowing for that length of time.

Prof. Hedrick: I should not like to try it. By that time you have worked all your plant humus out of the soil, and it is like ashes, it is light and in a poor condition. No, I would prefer grass mulch to that.

The Member: I know some orchardists that have been practicing the cultivation and perhaps allowing little weeds to grow up in the orchard in the fall and again next spring cultivate again, with no cover crop.

Prof. Hedrick: I am sure I would not like it. No, tillage and cover crop must always be coupled together; cannot get results without them.

Mr. Moyle: Is there any experiment on record where there have been kept two orchards, one in cultivation and another in pasture for sheep, say for ten years; has any such experiment ever been conducted for a term of ten years?

Prof. Hedrick: No, I know of no experiment that has been laid out with that express purpose in view. I know of orchards nearly side by side, under the same conditions, that have been managed under such conditions for a greater length of time than that. Most of you know J. C. Woodward and G. P. Wilson, Mr. Van Alstine of New York and men who advocate pasturing orchards with sheep, although the orchards they have are very old orchards. All the men, however, claim that if they were setting out new orchards, they should not use the sheep pasture, but for the old orchard with the old trees they find it more profitable to pasture with the sheep than to plow and cultivate.

Mr. Moyle: I am glad to know that. I made the statement to the society and they laughed at me. I suggested that we pasture our orchards with sheep, and they said down in Missouri where they turned in the sheep they would not need to spray, and a gentleman from Missouri said it was a failure all the time.

Prof. Hedrick: I am not advocating that practice at all.

A Member: We have run sheep in the orchards and killed the worms.

Prof. Hedrick: There must be some other conditions there. The orchards that I have known that have sheep in pasture need just as much spraying as any other. I do not take much stock in sheep as a means of keeping down pests.

Mr. Moyle: Don't you think it would be a good idea to make a test for ten years, to decide that?

Prof. Hedrick: The trouble is that it would not be of benefit to a great many people in commercial orcharding, because sheep growing and fruit growing do not go hand in hand, and it might be of decided benefit to some few gentleman farmers and gentleman apple growers, but for orchardists it would not have any great value. A man could make his orchard much more of a success by giving it good orchard treatment, and I do not advocate the sheep treatment as good treatment. It is successful under some conditions, but under most conditions we do not advocate it.

Mr. Goodman: Our orchardists in Missouri adopt rather a medium plan. We have a rotation in our orchards, so that we continue the cultivation or the grass land or the weed land and thus take care of two or three times as much orchard land with the same number of teams than we could if we simply used any one plant, and that rotation is followed thus: A plowing of the ground during the fall and the winter of part of the land, then we let it go during the summer with only one cultivation or harrowing, and allow the weeds to take that ground and we find the weeds as a cover crop almost equal to cow peas, which is our best cover crop. We then follow that over portions of the land which have been plowed, sow it to cow peas in June and let that remain as a cover crop during the summer and winter, sometimes pasture that ground with hogs, sometimes cut it off for feed, sometimes let it be on the ground. Then the next spring that ground which was sowed to cow peas we seed to clover. So we have the four processes going on all the time, and every fourth year this sod ground is turned over and we follow the rotation so that we do not allow the land to keep in sod any more than the four years. I am sure that up north here you need a winter cover crop, I am sure you need, as we do down south there, a summer cover crop also, and I think that one-half of the winter killing was caused, I know in our Michigan

gan orchards, by not having a summer cover crop as well as a winter cover crop, and the best summer crop you can have is to let the weeds grow, if you cannot do anything else, and we utilize the weeds as part of our rotation system, as worth as much to us as the clover, not as much as cow peas, but as much as clover. That is a part of our rotation. I think here in the north you need a later summer cover crop in August and September as much as you do a winter cover crop. We do, down with us, and a cover crop for the winter we do not care for specially there as you do here. We are plowing all winter long in the orchard and that winter plowing we use next spring by either planting corn, sowing cow peas or harrowing it down during June and letting it go to weeds or seeding it to clover. I am positive in our orchard problem it is just as necessary to have a rotation in our orchard ground of the crops that grow there as it is for any farmer to follow rotation. I am sure that we can keep up the fertility of our ground in that way. We had some ground in which we planted trees that we cannot grow corn on at all, and that ground, by the turning over of weeds and cow peas is loose and nice and has really good fertility to-day, so that we have grown our crop of fruit on it this year.

Mr. Reeves: In the neighborhood where I live there are a number of orchards of Baldwins and Rhode Island Greenings and all those old eastern sorts. They were successful orchards, they paid as well as any later orchards that I know of. Now, the owners of those orchards had a system of caring for their orchards; they plowed in the spring, then cultivated a few times during the summer and then from July on let the weeds grow. They laid that down as an established principle. Now, I wonder if we are not going backwards rather than gaining knowledge all these years. That was some forty years ago and those men who grew those orchards were successful. They have varieties that we do not attempt to plant in that same neighborhood now. They kept the ground enriched, I will say that, and that will take the place of rotation.

Mr. Moyle: It seems to me it would be a valuable experiment to be carried on for ten years, taking ten acres of orchard land, five acres to be pastured with sheep, the other five to be under cultivation. Spray the trees and pick the fruit in both orchards, sell it and take the money you get from the sheep for wool and at the end of ten years I am sure the five-acre orchard in which you had the sheep will pay the largest amount of money.

I hope some of the experiment stations will try that experiment for ten years.

Mr. Goodman: Any one plan followed for ten years successively is not the correct plan to follow in my opinion. I would use the sheep and we do use sheep, but it is a part of the rotation in a plan which we follow. We use hogs and let them pasture down for one or two or three years, but to follow the same plan right straight through is just as wrong as it is to cultivate very thoroughly during the whole of the season, which is wrong.

Mr. Bingham: We start in the early spring and cultivate until about the time the fruit is ready to harvest. We suspend cultivation during the harvesting and then begin and cultivate once or twice more in the fall. Some of us have not been practicing having a cover crop any more than what amounted to weed growth from the time of cultivating to freezing up.

Mr. Goodman: Don't you get quite a little covering of weeds?

Mr. Bingham: We get a covering of weeds that covers the ground entirely.

Mr. Goodman: Well, that is right.

Mr. Rowe: We have one or two men, three men perhaps, in our county that have been able to grow apples that were just enough finer than the apples grown by any other person to get from two to three times as much per bushel as the other fellows were able to get and we have been observing their methods somewhat. One man, Mr. Charles Wilde, last year, when apples were cheap, was able to get at his own place seven miles out of the city from \$1.25 to \$2.00 a bushel from the best grocerymen; they came out and got them; he had a little over five thousand bushels. This year he is getting better than \$2.00. At our State Horticultural meeting he showed thirty varieties and there was not a single apple that could be found that had either a worm hole in it or a scab. At one of our institute meetings held right near his place he went into the storage and brought a box that was taken out at random and turned out on the table and you could find neither a scab nor a worm in his apples. Now, this man cultivates thoroughly, and he cultivates until after the 10th of September and his reason for doing that is that he wants to destroy by cultivation the homes of all the larvae that have gone into winter quarters to come up and sting his apples next year, and he cannot do it unless that is done. We know that

they all burrow within an inch of the surface of the ground and that they have all gone into winter quarters before the 10th of September, but if cultivation is stopped by the first of July, they are simply all housed there in nice quarters ready to hatch out in the spring and you have got your pest to fight again.

The President: Does he spray?

Mr. Rowe: He sprays thoroughly, but he says he never was successful with his spray unless he kept his cultivation up in that way.

Mr. Crawford: Has he had any winter killing?

Mr. Rowe: No, he has no winter killing at all. I might say this orchard is twenty-five years old and it was set to apples and peaches. The peaches are now gone, the last of the peaches were pulled out two years ago. Now it is an apple orchard, the trees were set sixteen feet apart and every other tree in the row was an apple tree and now the peaches are gone. He has kept up that cultivation for several years.

Mr. Henry: Do you think that method would answer here in Wisconsin just as well?

Mr. Rowe: I believe it would.

Mr. Street: How does he keep his fertility, the humus?

Mr. Rowe: The humus in the ground,—well, he puts on plenty of manure. He has quite a dairy in connection with his place and his stable manure is scattered out. About the 10th of September he sows oats, he gets quite a heavy stand of oats.

Mr. Goodman: He is doing the right thing exactly.

Mr. Rowe: But the main point I am trying to make is that it seems to me in all this talk of cultivation, you stop cultivating too quickly. The last three or four weeks it seems to me is the more important time to cultivate in order to help the spraying time out the next spring.

Mr. Toole: Are you troubled with winter killing under any conditions?

Mr. Rowe: Yes, we have some winter killing, but I think a great deal of what we call winter killing has not been winter killing. We have four men that have claimed that they were able by cultivation and treating of the soil to enable their trees without any cover crop to stand from eight to ten degrees more frost than they would otherwise and that by constant cultivation and no cover crop at all by the very liberal use of wood ashes. I know of one of our best exhibitors and the best growers for years, E. J. Philips, who was right close to the city and

he never had a cover crop and he grew the tenderest varieties of peaches and cherries by the liberal use of hardwood ashes. His teams were hauling ashes from the city all the time and he claimed his trees would stand from eight to ten degrees more frost, and I know, following that hard winter weather when no one in our section had any peaches the next year to speak of, because the buds were killed, Mr. Philips' were not any better looking than Mr. Grimes' or my own, but he had peaches to sell at \$3.00 a bushel and plenty of them, not as many as usual, but he had peaches. When cherries were all gone, Mr. Philips always had cherries. He contended, although it was disputed by many, but the old man always contended that he, by the liberal use of wood ashes, was able to make his trees that much hardier so that he did not need any cover crop. I don't know whether there has been any experiment carried on along that line.

Mr. Sperbeck: It seems to me that the late cultivation would stimulate a growth and be injurious in a northern latitude; that the wood would not mature in time to stand the winters.

Mr. Periam: That is a fallacy; the late cultivation does not necessarily throw the tree into late growth. Occasionally under any system the tree will stop growing and then take on a later growth, but the continuation of cultivation through the whole season does not necessarily, nor does it really, carry the tree into winter quarters with immature, unripe wood. That is the result of circumstances they get now and then.

Mr. Rowe: I have found in my own experience that when I had cultivated constantly until the 10th or 15th of September, that it did not cause trees to continue their growth longer than those that I stopped cultivating in July, but I found on the other hand that when I had a piece that was left and could not get out to plow it and did nothing with it until way along to the first of July, that there I would have a late growth. But when I began to cultivate early and kept it up late it did not continue the growth longer than if I had stopped. If I began late, that is where I had the trouble.

BORDEAUX MIXTURE AND HOW TO MAKE IT.

PROF. S. A. BEACH, Iowa State College.

I will talk to you a few moments upon the old subject of spraying with Bordeaux mixture. Bordeaux mixture has come to be recognized as par excellence the best liquid preparation with which to hold fungous diseases under control, speaking of those diseases that attack our fruit bearing plants. It is a mixture which was accidentally discovered; the hint was obtained from the practical experience of fruit growers in France; it is not something that was first worked out by scientists and then handed over to the fruit growers, but it is something which came from the fruit growers themselves. The story is of interest, it has been told a good many times, but I want to tell it again, as to just how this Bordeaux mixture came to be known.

The French grape growers some years ago found that an American disease was devastating their vineyards; it was the grape mildew, something that had been imported from this country, and was spreading there very rapidly, and causing a great deal of damage. In one of the districts near Bordeaux where grapes were grown, some of the grape growers were bothered by the pilfering of grapes from those vines that stood next to the road; people passing by would help themselves to the fruit and they determined to do something, if possible, to scare them. They did not wish to poison the fruit, but they did wish to make the people who went by believe that they had put something on that would poison them; so they took copper sulphate and mixed it with fresh slaked lime, and with a whisk of twigs spattered it over the grape vines along the road. It so happened that these men had the mildew on their grape vines and the important discovery was made that where this mixture of copper sulphate and lime had been spattered on the vines they did not have nearly so much of the mildew. This fact was reported to Millardet, professor of the faculty of sciences in Bordeaux. From this suggestion he and others worked up the method of making the preparation which we now know as Bordeaux mixture. In 1886, I think it was,

our United States department of agriculture first took the matter up and helped to introduce the use of this mixture in this country. We were then told to dissolve six pounds of the copper sulphate and slake four pounds of lime, mix the two together and dilute to twenty-five gallons; that made a mixture in which we had one pound of copper sulphate to make a little over four gallons of the Bordeaux mixture, a very strong mixture and it was also a different mixture to apply, as those of you can testify who had anything to do with making it. We would try to strain that mixture through sieves and gunnysacks and hold our temper and keep from saying our Sunday School lessons the wrong way while doing it, which sometimes was not an easy matter to do. But with years of experience in using this mixture, we have found some important improvements that are of interest to anybody who has anything to do with it. As you are fruit growers, I take it that the larger proportion of you have, or will have, something to do with this Bordeaux mixture, because it is one of the most efficient weapons that we can use against these fungous diseases which we must fight if we are to be permanently successful in fruit growing.

The first thing I will say about the preparation of the Bordeaux mixture is that instead of weighing out the definite amount of copper sulphate that you need each particular time you use the formula, it is possible to dissolve the copper sulphate beforehand, and know how much you have in solution, and measure the number of pounds by the number of gallons you use.

First, with regard to the dissolving of it, if you would hang it in the top of the liquid the way I have hung this here, that is the best way to dissolve it, because as the water takes up the copper sulphate it becomes heavier and drops down to the bottom of the vessel; fresh water which is not charged with copper sulphate takes its place and the operation goes on until the water is saturated with the copper sulphate; whereas, if we drop the copper sulphate in the bottom of the water in the first place it takes a great deal longer to dissolve it. So in dissolving the copper sulphate, hang the copper sulphate in a sack in the top of the water. That is a little point, but it is a good thing to know.

By keeping more of the copper sulphate crystals in the vessel than the water can dissolve we may be sure that we have a

saturated solution; that is to say, the water has taken up all the copper sulphate it can hold. In that case at the ordinary temperatures at which we use water, we have about fifty cunces of copper sulphate in every gallon, practically three pounds to the gallon. So you can if you choose dissolve the copper sulphate now in February that you are going to use next summer. So long as you have a saturated solution, more than the water will take up, you know that every time you dip out a gallon measure of it, you have dipped out practically three pounds and it is not necessary for you to weigh it.

What is the Bordeaux mixture? It is simply a compound made from dissolved copper sulphate and fresh slaked lime. Why do we use the lime with it? The fungicidal properties are in the copper sulphate, not in the lime; it is because of the copper in the mixture that it is injurious to the fungus, not because of the lime in it. Why then do we use the lime? We use the lime to prevent the copper from injuring the foliage. In all this work of using insecticides and fungicides, the difficulty is to find something that will prevent the fungus from growing or that will kill the insect without at the same time injuring the foliage that we are working on. It is easy enough to find plenty of things that will kill the insects and kill the fungi, but the difficulty is to find something that will do that without injuring the foliage. Bordeaux mixture does not always do that. Sometimes we get some unjury to the foliage by the use of Bordeaux mixture. But the copper sulphate solution is decidedly more injurious to foliage, so we use lime to combine with the copper sulphate and make a mixture that will not injure the foliage. The least amount of lime which it is safe to use is about two-thirds as much by weight of the stone lime as you have of the copper sulphate. That is a safe proportion; it will supply more than enough lime to combine with the copper sulphate. Thus, the formula which calls for six pounds of copper sulphate, and four pounds of lime is safe because it provides more than enough lime to combine with the copper sulphate. But if we have dissolved the copper sulphate so we can measure the number of pounds of dissolved copper sulphate by the gallon measure.

Is there not also some way in which we may tell whether we have enough of the lime so that it will not be necessary

to weigh the lime each time? If so, it has an advantage because in slaking the lime for the Bordeaux mixture it is best not to use it at once, just the minute that it has slaked. If you do you will find more grit in it then than you will if you let it remain a little while to become more thoroughly slaked. When masons slake lime for making plaster they prefer to let it remain a while after slaking before they use it. In making Bordeaux mixture it is also best to let it remain an hour or two in slaking so that all through it the fine particles will become slaked.

If we do slake the lime beforehand how can we tell when we have enough lime to combine with the copper sulphate? By a very simple test. I have here a poisonous substance, a yellow crystal, which is called prussiate of potash; the chemists call it by the name of potassium ferrocyanide. Five cents worth of it should be enough to last a man through the spraying season. Dissolve and it is ready to use. A little of it put in the mixture will find any of the free copper sulphate. In using this, all that is necessary is to drop a drop of it into the Bordeaux mixture which you have made, and it will show a dark color when there is not enough lime, but if there is lime enough it does not change color (demonstrating). You see here the dark color; it shows that some of the copper sulphate is free in such a manner that it will injure the foliage; and therefore more lime is needed. By using this test we are enabled to dissolve the copper sulphate beforehand; we are also enabled to slake the lime beforehand; we can, if we choose, slake enough to last for a week at a time because at any time we can tell by this test whether we have enough lime in the Bordeaux mixture.

Now, one point more. As an extra precaution to prevent possible injury to the foliage, it is well to have an excess of lime, particularly if you are using with it, as we usually do now, Paris green or some other arsenical poison against the insects. So after you have tested the Bordeaux mixture and find that you have enough lime, being sure, of course, that it is stirred thoroughly before making the test, then add some more lime, so that you will be doubly sure that there will be no injury to the foliage on that account.

Mr. Goodman: Would it be safe if we always use 4-4 instead of 6-4 formula.

Prof. Beach: The 4-4 formula calls for an equal weight of copper sulphate and lime. It is a safe measure; in fact, it is a disadvantage to use greatly more than that, because if you use too much lime it tends to counteract the fungicidal action of the mixture and so it is not well to use lime in too great an excess. An equal weight of copper sulphate and of lime is a very good rule. By a little practice in following the plan which I have given you can tell just about how much extra lime you will need to add in order to make your formula correspond to the one having ingredients of equal weight such as the 4-4 formula.

A word with reference to the strength of the Bordeaux mixture. As it was first used it was altogether stronger than needful in combating fungous diseases. The strength of the Bordeaux mixture can be varied to suit conditions. If you are spraying for the potato blight, you need a stronger mixture than you do if you are spraying apples for apple scab or peaches for peach curl. In spraying the apple orchards, a Bordeaux mixture which contains four pounds to forty-five gallons, or even four pounds to fifty gallons, is strong enough for all ordinary conditions. But if you are spraying potatoes for the blight, I would advise you to use one pound of copper sulphate to make eight or even seven gallons of mixture. That is to say, you would use six pounds of copper sulphate in spraying potatoes for blight, whereas in the apple orchard you would use but four pounds for an ordinary fifty gallon barrel. The ordinary kerosene barrel will hold a little over fifty gallons usually and when conveniently full it will hold from forty-five to fifty gallons.

There is a very important point about the way in which the mixture is put together. I wish to call your attention in particular to that. The good housewife can take flour and water and perhaps a little salt, possibly a little bit of sugar and some yeast and she will handle it so as to make good bread where you and I would make a botch of it. We may use the same materials, but we do not manipulate them in the same way and we do not get the same results. There is just about as much difference as that between the right way and wrong way of making Bordeaux mixture. If you make Bordeaux mixture one way, it is a mixture which settles rapidly to the bottom of the barrel, and one which needs to be agitated all

the while in order to have it put on at all satisfactorily. For various other reasons it is not as desirable a mixture to use as the Bordeaux mixture is when it is made properly. Let me demonstrate that to you. (Demonstrates.) From this saturated solution I will take a small amount of the copper sulphate and put the same amount in each one of these glass cylinders. Now, the directions which we received when we first began to work with the Bordeaux mixture was to dissolve the copper sulphate, put that in a barrel, slake the lime and put that in the barrel and then dilute the whole mixture to twenty-five gallons and this was the way we did it. (Demonstrates.) Now, we will take the copper sulphate solution in the other glass cylinder and first, before putting in the lime, we will dilute it to about one-half of the amount required to fill the formula. We will also dilute the lime to about one-half of the amount required, and then having both of them so diluted, we will pour the two together. Now, that is the Bordeaux mixture made in the proper way. You can see the difference that it makes in the kind of mixture that is obtained, whether the ingredients come together dilute, or whether they come together in concentrated form. This one which was made in concentrated form has already settled down, while I have been talking. You can see how rapidly it has settled to the bottom. Whereas, this other which was made in dilute form can stand from a half hour to an hour without settling, but a very little.

Notice with regard to the use of the Paris green or other insecticides, which are combined with the Bordeaux mixture, that having made the Bordeaux mixture in this way by bringing together the two ingredients in dilute form, lastly, we add the Paris green. The reason for this is that the Bordeaux mixture is composed of a sticky compound which is in suspension all through the liquid. When the Paris green is put in last, that sticky substance will hold the Paris green in suspension all through the liquid. Paris green is very heavy. If you do not believe it, put some in a tumbler of water and see how quickly it settles down to the bottom of the tumbler. When spraying Paris green on potatoes or on fruit trees, it is more essential than many think to keep the mixture thoroughly stirred in order to insure its even distribution and to prevent injury to the foliage. The other day I had a letter

from a gentleman living in Iowa who has about a hundred and sixty acres of apple orchard which he sprayed last summer. He sent me some samples of the leaves and complained about the fact that in spite of spraying the leaves showed that they were injured. An examination showed where the spray mixture had collected along the lower side of the leaf and killed the tissues; in some cases along the lower edge, in other cases on the tips of the leaves it showed where the mixture had run down and evaporated. Being thus made of concentrated strength it burned the tissue. You will find a great deal more trouble of this kind where you do not keep the mixture thoroughly stirred all of the while that you are making the application of the arsenical poison. Too many people in spraying potatoes with Paris green burn the foliage without realizing the amount of injury that they do in that way. In using Paris green, put it in last, so that the Bordeaux mixture will help to hold it up in suspension.

It is not necessary, however, to use as heavy a substance as Paris green for poisoning the insects. You can use the arsenate of lead, which although more expensive, can be put upon more tender foliage, that is, foliage that is particularly susceptible to injury from arsenical spray like plum foliage, with greater safety than you can put on Paris green. It is sometimes called disparene or rather disparene is a trade name for it. But you can yourself prepare an arsenical which will be less expensive than the Paris green, and if you are using it in any considerable quantity, it will doubtless pay you to do so. Get ordinary white arsenic which when bought in quantity, can be purchased very cheaply. Boil it with common sal soda, the washing soda, in order to dissolve the arsenic. This has been done with the sample I have here. This is the white arsenic boiled with sal soda, till, as you see, the arsenic dissolved. This gives an arsenite of soda which can be used by putting it right into the Bordeaux mixture. Be sure that you have an excess of lime so that the arsenical will not burn the foliage. It can be used in place of the Paris green at the rate of one pound of white arsenic, where your formula calls for two pounds of the Paris green. That is to say, if your formula for spraying the apple orchard calls for one pound of the Paris green to 150 gallons, you can use instead a quantity of this arsenical solution equivalent to one-half pound of white arsenite of soda.

arsenic, because the white arsenic is twice as strong as the Paris green. It can be boiled as just directed and then put away and kept indefinitely. By knowing just how many pounds of white arsenic you have in a certain number of gallons of this liquid you can measure it out by the pint or by the quart and know exactly the equivalent amount of white arsenic which that pint or quart represents. In that way you can use it against all leafeating insects, such as the codling moth, tent caterpillar, the potato beetles and other insects which injure foliage by eating it. This, when used with Bordeaux mixture should also be put in after the Bordeaux mixture is made. Summarizing what I have said on this matter, notice:

We can dissolve the copper sulphate readily and keep it in solution, and approximately know the number of pounds we have in solution if we keep the solution saturated. You can of course dissolve, say, fifty pounds of the copper sulphate in twenty-five gallons and know that you have two pounds in every gallon, but if you leave that exposed to the air, gradually it will evaporate, and if you give it time it will evaporate until it contains about three pounds to every gallon, whereas, if you use a saturated solution in the first place it does not matter how much is evaporates because the solution can get no stronger.

We can slake the lime beforehand and know how much lime we have by using the ferrocyanide test to show how much is required to combine with the copper sulphate.

We can prepare the Bordeaux mixture so that it will make a heavy mixture that will settle quickly to the bottom if we choose to do so by combining the ingredients in concentrated form, or if we choose to follow a better plan and combine the ingredients in as dilute form as possible we can prepare a Bordeaux mixture which will hold up so that it needs less agitating.

We can greatly add to the uniformity of the distribution of the Paris green or other arsenical if we add it the last thing after the Bordeaux mixture is made.

DISCUSSION.

Mr. Bingham: The gentleman said that in making the saturated solution it did not matter any time after that how long it was kept, at any time you could tell how much blue vitriol there was in it.

Prof. Beach: Yes.

Mr. Bingham: If you make a saturated solution and leave it stand two or three weeks and it evaporates, what becomes of that extra amount of the blue vitriol?

Prof. Beach: It will crystalize on the outside of the barrel. I have specimens of the other arsenicals that are used. This one is Swift's arsenate of lead, which is a form that can be used on plum foliage with less liability of taking off the leaves than if you used Paris green.

Mr. Rowe: Did you not give us the formula for making this?

Prof. Beach: I will not attempt to give you the formulas for two reasons: First, if I give to you, you will not remember them, and you can get them better by sending to your stations and find them in the bulletins printed there.

Mr. Rowe: The reason I asked the question, I used that altogether last year. I made it myself, and the cost, as I remember now, was about seventy-five cents for 250 gallons.

Prof. Beach: I would advise any one to get that formula from the experiment stations. Here is another form of the same general compound which is called Disparene. That is a proprietary article, but it is practically arsenate of lead and used for the same purpose.

Mr. Goodman: Is it perfectly safe to use Disparene in the Bordeaux mixture?

Prof. Beach: I have found it so. I have not had any contrary experience.

Mr. Goodman: I never had, but some men reported that it was dangerous to use it, that is, it was no good.

Prof. Beach: Well, let me state this, by using the Disparene you need to use probably three pounds of Disparene where you use one pound of Paris green and they may not have used it strong enough. It is a more expensive, although a safer thing to use than Paris green.

Mr. Johnson: I would like to ask if you prepare the Paris green in any way? How do you apply the Paris green when you put it in?

Prof. Beach: Well, we take Paris green in this ordinary form, weigh it out, if we are to use four ounces to the barrel, weigh it out in a little sack and then when we get ready to put it into the Bordeaux mixture, instead of doing as you have seen some men do, take the sack and dust it out on the top of the barrel and have it roll off in little balls on top of the water, we go again to the good housewife for some good sense and do the same way that she would do if she were putting flour into gravy, that is to say, wet it with a little water, then it will go all through the mixture in uniform proportion.

Mr. Smith: I would like to ask what proportions of arsenic and soda is used, in combining to make this solution that you spoke of?

Prof. Beach: Yes, I did not give you that. I will break over my rule that I stated and I will give you that. In making the arsenite of soda for one pound of white arsenic you need four pounds of sal soda.

Mr. Smith: How long do you have to boil it?

Prof. Beach: Well, usually it will be made in 15 minutes' boiling, to put it all in solution.

Mr. Smith: How much water?

Prof. Beach: Oh, well, you will find that a pound of the arsenic and four pounds of the sal soda and two gallons of water will give you a very good formula to use. Then you know that in every gallon of water you have what is equivalent to one pound of Paris green. And, let me say, that if you put in a certain measure of water in boiling, and that is partly evaporated during the process of boiling, and when you get through boiling put in some more water to make up for what was lost in boiling, so that you will have the same measure when you get through as you had when starting.

Mr. Rowe: If I did not misunderstand you, you said you put three pounds of copper sulphate, dissolved it in one gallon of water?

Prof. Beach: Yes. I said you can do that for your use.

Mr. Rowe: We have never been able to get more than one pound in a gallon of water and hold it there long.

Prof. Beach: Well, Michigan water must be different from

New York water then. We get three pounds in there; I think you ought to be able to crowd in more than one up in Michigan.

A Member: I would like to ask how much arsenite of soda you use?

Prof. Beach: I would use it on the basis of how many pounds of white arsenic you have in your solution. If you make a solution according to the formula that I just gave, in which you have one pound of white arsenic in two gallons, then you see you have a half pound of white arsenic in every gallon, haven't you. Now, that is equal to one pound of Paris green, and use it in the same way that you would use Paris green. Is that clear?

A Member: Don't you put more lime in your Boardeaux when you use the arsenite?

Prof. Beach: Well, if you have even 4-4 lime, then you have enough lime to take care of the arsenic in the arsenite of soda. If you are using the arsenite of soda on your peaches without Bordeaux mixture, then it would be necessary for you to put in, I should say two pounds of lime for every pound of the white arsenic, so that you would be sure that you will not burn the foliage.

A Member: Does soft water dissolve copper sulphate as hard water?

Prof. Beach: Either will dissolve it.

Mr. Goodman: The question is, will it dissolve it more readily?

Prof. Beach: Soft water would dissolve it a little more readily; not enough to make any difference in practical work.

PRUNING.

PROF. E. P. SANDSTEN.

The subject of pruning is one on which there is abundant room for opinions and disagreements. Hardly two fruit growers will agree exactly as to the manner a given class of fruit trees should be pruned. Individual opinions are prerequisites to suc-

cessful fruit growing and nowhere can individualism show itself to greater advantage than in pruning, hence the question of form or shape to be given a fruit tree depends upon the conception of the individual. This being the case, this paper is written from the personal point of view, rather than from generalization of other people's ideas.

Apart from individual ideas of pruning a few principles can be laid down which may be safely followed by beginners and amateurs. First, it is well to consider that in dealing with a tree we are dealing with a complex organism, not an individual but a collection of individuals or a colony. Between the different buds or individuals in this colony there is a constant struggle for existence, resulting in great mortality between the warring buds and branches. Those occupying the favorite positions with respect to light, moisture and food supply, naturally survive and grow stronger, while the others gradually starve to death. This struggle is nature's way of pruning and we should not look upon our pruning as a devitalizing and injurious process, but rather as a means to regulate the struggle by cutting out the weak and undesirable branches and shoots and selecting those which will form the most advantageous shape of a tree. So instead of permitting the struggle for existence to settle the supremacy between the different branches and shoots, the wise fruit grower stops the battle and directs the future development of the tree to best serve his purpose.

We may consider the subject of pruning under three separate heads. First: Pruning to maintain a balance between the production of wood and the production of fruit. Second: Pruning to shape the trees to facilitate the various orchard operations, such as pruning, thinning, spraying, etc., Third: Pruning to shape the tree to conform to the owner's ideal of form.

Pruning to maintain a balance between fruit production and wood growth.—Pruning so as to maintain a balance between these two functions is of vital importance to the fruit grower because upon such balance success or failure depend. In nature the trees come into close contact with other trees and a struggle for existence between them results, the stronger ones crowding out the weaker. In cultivation this struggle for existence between trees is eliminated and they are given an opportunity to develop without much competition. It is obvious that under such conditions the natural tendencies and functions of the tree are

often thrown out of harmony. If the soil is very fertile, or especially rich in nitrogen, the wood producing functions tend to crowd out the fruit producing functions, or if the soil is poor, fruit production is encouraged at the expense of wood production and the vitality is affected, which may result in premature death. Often under conditions such as these, intelligent pruning may correct the difference.

Pruning for wood.—(Winter and early spring pruning.) The best time to do general pruning is from the 15th of February to the first of April. Wounds made at this time will heal very readily and there is little devitalizing effect on the trees. It should be remembered that pruning at this time acts as a stimulant and tends to encourage greater wood growth. Hence winter and spring pruning should be practiced on young trees during their formative period and on old, run down trees, which have become weakened and unproductive from the lack of young wood. All heavy pruning should be done at this time, as there is less danger of the wound becoming diseased, and besides the healing process is most rapid in the early spring.

Pruning for fruit.—(Summer pruning.) As a rule heavy wood growth is not conducive to fruitfulness, while slow wood growth encourages fruit production. Light summer pruning is employed to check the wood growth and induce the formation of fruit buds. In order that summer pruning may be effective, it should be done from the 15th of June to the 15th of July in our climate. The young shoots will have grown to the length of 8 to 12 inches and should be pinched back two to four inches. Now and then a leading shoot should be left to grow. The buds below the pinched portion will, as a rule, begin to swell and develop into fruit buds. Should the secondary leaf buds start after pinching back, the operation should be repeated. No heavy pruning of apples, pears, cherries and plum trees should be done during the summer. The result will generally prove serious, since by the removal of the leaves the tree is unable to elaborate food to supply the root system and the development of new shoots.

On the other hand the root system continues to supply more water and mineral matter than the leaves can make use of and bad results follow. To be on the safe side, we should confine the summer pruning to the pinching-back process and the rubbing off of water sprouts.

Pruning to facilitate spraying, thinning, harvesting, etc. The most successful grower is one who can produce the best possible crop at the lowest possible cost. Low headed trees will naturally lessen the cost of spraying, since the trees are closer to the ground and can be reached and covered readily. Thinning and harvesting can be done more cheaply from low headed trees than from high headed. Those of us who have picked apples from the old style trees with branch and trunk resembling our elms and oak can appreciate the advantage of low headed trees.

The old style trees are not economical. They carry too much unproductive wood, which consumes food otherwise used for the production of fruit. The modern fruit grower wants a business tree—one that devotes the larger part of its energies to producing fruit, and at the same time permits of easy pruning, spraying, thinning and harvesting. These operations necessarily play an important part in the economical production of the fruit. Low headed trees will not break down as easily as a high headed one, and the fruit will not blow off as quickly. Sun scald, one of the besetting evils of northwestern fruit growing, is practically eliminated by low headed trees.

I have no arbitrary height at which fruit trees should be headed—any height below 24 inches. This may seem too low to most people—especially those who are in the habit of growing and pruning apple trees into forest trees. But bear in mind that we want an apple tree and not a forest tree, that we want fruit and plenty of it, and not fire wood. The nurserymen are willing (if not, they should be) to supply low headed trees if we demand them, but as long as we prefer fishing poles and whips, we will be served with them. It may cost more to grow low-headed, stocky trees, since a fewer number are given on a given area, and besides, it demands more labor, but the time is at hand when the fruit grower is willing to pay if he can get what he wants.

Pruning to shape the tree to conform to the owner's ideal.—This phase of pruning is the most difficult to discuss because the question is not based upon any well founded scientific principles. It matters little whether a grower prunes his trees to a pyramid shape or a vase shape, whether it is hollow centered or left in the natural shape, so long as the foregoing principles of pruning have been observed. Personally I prefer an open centered tree, with moderately spreading branches. Perhaps I prefer this

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An old-fashioned, high-headed tree. All the energies of the tree are consumed in maintaining the large wood area. The fruit is borne at the extreme ends of branches. Tree difficult to spray, prune and harvest fruit. Illustration after S. T. Maynard.

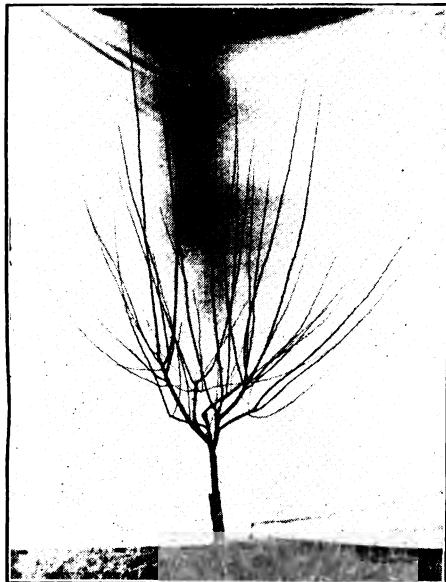
An ideal apple tree—low headed, symmetrical and open centered. Note the absence of central leader.



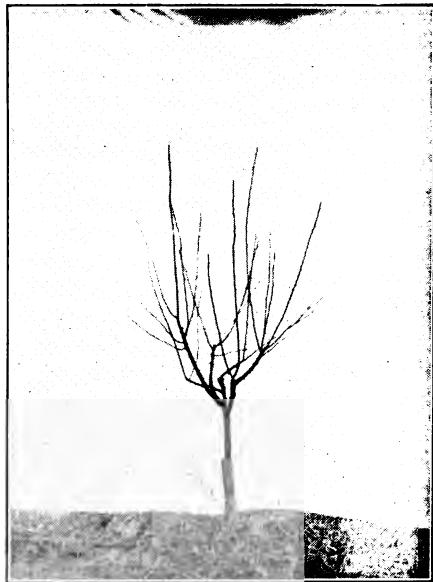
A native plum tree before being pruned.



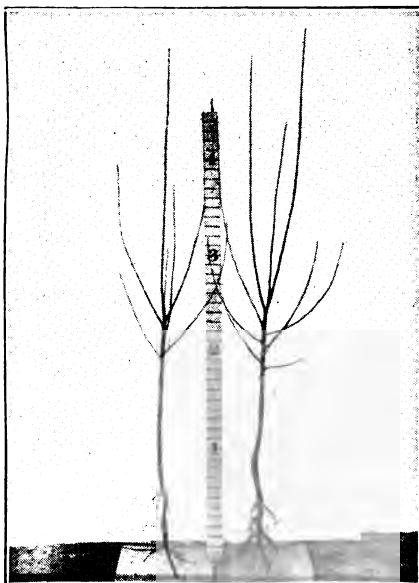
Tree after pruning. The branches cut back only a little to prevent excessive wood growth.



A well grown native plum tree before pruning.



Note thinning out the center and shortening the branches to prevent breaking when loaded with fruit.



Two ideal nursery trees (two years old).



Two ideal nursery trees pruned ready for planting. Tree to the right is pruned for a leader. Tree to the left for a center without leader.

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style of a tree because it is an ideal with me and one I should follow in planting an orchard—with you it may be another shape. The ideal, however, should never be allowed to interfere with the general principles of pruning, and the most economical way of caring for the trees.

Pruning after planting.—With these few remarks upon pruning in general, we may start with the young tree when ready to set in the orchard. Personally I prefer a strong two-year old tree, with head formed within 18 to 24 inches of the ground. If three-year old trees are used, I should want them headed back severely at the beginning of the second year so as to form a low-headed, compact tree.

If, however, we have to accept what we can purchase in the market, the first thing to do it to decide upon a shape or ideal the grower wishes to follow. If open or hollowed centered trees are wanted, the leading shoot should be cut out entirely and the strong secondary branches pruned back to about four to six inches, depending upon their size. From four to five strong secondary branches should be left and these should be located little above each other and be distributed around the trunk. If on the contrary we wish to maintain a leader, we should only cut back the leader from two-thirds to one-half of the past season's growth and the secondary shoots proportionately. It is seldom advisable to prune back to the old wood when planting, excepting peaches and apricots. These may be cut back very severely without danger. The foregoing remarks are especially applicable to apples and in a measure apply to the pruning of plums.

The pruning of the trees a second year after planting is an important operation and should be carefully done, if the best results are to be expected. The ideal that the fruit grower has in mind should be emphasized and the young trees shaped to conform to it. If the pruning has been done carefully the first year, it will be much less the second, consisting mostly in the removal of shoots which cross or interfere with other shoots, or shortening in some of the branches, which are growing unduly fast so as to give the weaker ones a chance to develop. The subsequent pruning of the trees should be along the same line as indicated. No severe pruning, as a rule, is necessary, for if the trees have once attained a proper form, and yearly judicious pruning done, there is little occasion for severe cutting.

After the trees come into good bearing, pruning on the same scale should be continued. Most fruit growers will find that if the trees have been properly pruned up to the time of bearing, that the two functions of wood growth and fruitfulness are well balanced and that the tree will generally take care of itself. Personally I have no sympathy with the fruit grower or farmer who prunes without any idea as to the needs of the tree. In fact, the pruning is with him nothing but a trimming process that is performed once in five or ten years. Such pruning or trimming is always injurious.

So far no mention has been made of the method of cutting and disinfection of the wound. As a rule small branches, one inch in diameter and smaller, need no further attention after cutting. Larger branches should be painted with thick lead paint to prevent the ingress of fungous diseases. The cut should be made as close as possible to the stem or the main trunk and be left smooth. A cut so made will heal quickly and decay will be prevented. If stubs are left, these invariably prevent the healing of the wound and form an excellent place for the spores of the fungi, and black heart and decay result. A great deal of decay and rotting in our orchards come from bad pruning.

Before closing, a few moments' thought should be given to the pruning of our native plums. Those of you who have had the privilege of dealing with these trees, know the difficulties which are encountered. It is impossible to predict the shape or the direction or growth of a native plum tree. If we endeavor to prune a branch with the idea of directing the terminal bud left, we are generally disappointed. It may take any direction. If, on the other hand, the branches are permitted to grow without cutting back, disastrous results are sure to follow. A young plum tree will grow as much as six or seven feet in a single season, making long, slender branches. The subsequent branching generally takes place near the end of the shoots, leaving long slender branches, which upon fruiting, are bound to break. Still, if we cut back the long shoots to within a foot or two of the old ones, a great number of secondary branches develop, which in turn must be removed the following year, which entails a considerable amount of labor. Still, I firmly believe that this is the most rational method of pruning the native plum. Long slender plum trees should be avoided, as they invariably split. The head should be formed of at least three branches,

four or five is better still, but these should be situated one above the other, on the trunk, and not concentrated at one point. I also believe that we are making a considerable mistake in pruning the plum. If we wish to prevent as much breakage as possible, we should permit the branches to spring up as close to the ground as possible, making it a compact bush, rather than a tree. From observation I have found that 75 per cent of the trees in plum orchards have invariably broken down or split from wind or over-loading with fruit. This in a measure can be prevented by extremely low heading of the trees. They may not be as convenient to cultivate, but this is a secondary matter, if we can prevent the trees from breaking.

In regard to cherries, little pruning is necessary. In fact, beyond the first or second year no pruning should be done. They naturally form a symmetrical and well-balanced head and the wood growth is, on the average, consistent with the production of fruit. There is great danger in severe pruning cherry trees, since the wounds do not heal readily and decay invariably sets in. The same is true in planting young cherry trees; they cannot be cut back as severely as apples or plums—relatively little pruning should be done.

I have often noticed in buying fruit trees from nurseries, that careless pruning has been done. Instead of cutting off a branch or twig in the nursery close to the trunk or main branches, stubs from one to three inches are left. These stubs prevent the healing of the wound and black heart and decay set in, resulting in the premature death of the trees.

DISCUSSION.

Mr. Taylor: You spoke about trimming trees in the summer to make them form fruit buds, I would like to ask you what time in the season?

Prof. Sandsten: The fruit buds begin to form the latter part of July up to the middle of August. Now the seasons vary, the time varies from year to year. It is a fact that in all the ordinary fruit trees, the fruit buds form the season before, generally in July.

Mr. Goodman: Would it not remedy your plum pruning to prune one-third of the branches down, or one-half, and leave

the other half to carry fruit on them? We have some large growing peach trees growing the same way. You cannot make all the cuts, you have to make too much of a cutting, vary the places of cutting down, cut one half this way, and then up half-way, and then a little off the top.

Prof. Sandsten: I did that to a certain extent, but we cannot tell—the worst part of our plum tree is, they go in all directions, they go horizontally. If they would take a general direction like the peach tree, we would be sure of their way, but they do not take that way. Some of them go down and go up again; they have very bad habits.

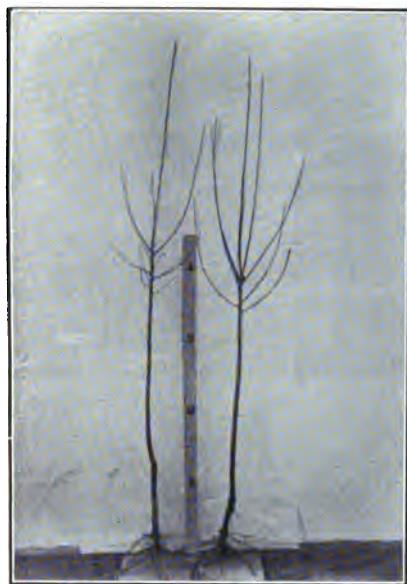
Mr. Crawford: How would it do to let those plum trees go altogether unpruned?

Prof. Sandsten: They would look like a brush pile. They would be all right if you keep them in the woods, if several of them come together, then they will stay up, but you cannot spray them or do anything with them when planted close together, and when not planted close together they will grow in all directions; you cannot do anything; they are not civilized at all. I would like to ask Mr. Marshall what his idea of pruning native plums is and what his experience is. He has a large native plum orchard and he has run up against some of the problems that we have.

Mr. Marshall: I am a great deal like you are, I find I know nothing about it, and the more I prune them the less I know. Mr. Rowe I think spoke about pinching them back in the summer, along in August about the time the terminal buds form, is that what you mean?

Mr. Rowe: No, sir, pinch them back when they get out just as much as you want of them, two or three feet. The Burbank will grow in the old way sometimes ten feet, but we have watched those young trees and when we have a length of limb as long as we want, we trim off the terminal bud, usually about June, just after the thing starts to grow. It starts in a hurry when it starts.

Mr. Marshall: I never have tried that. I have tried trimming the terminal buds off, and that was not at all successful, and I think that the native plum is much more difficult to prune than the Burbank. I have some Burbank trees, about 50 Burbank trees in my orchard; I never have had the difficulty with them that I have had with the native plum. Take such a plum as the Wyant, that insists upon growing upside down, and it is



Two well grown apple trees but too high-headed. Should have been cut back at the end of the second season. The kind of tree the average grower demands.



Trees pruned and ready for planting. Tree to the left pruned to a leader. Tree to the right pruned to a hollow center and spreading head.



Different styles of pruning shears. Different styles of pruning saws. After Prof. L. B. Judson.

pretty hard, I have never found any way to turn it around by pruning, and the other trees, all of the native plums, with the exception of a very few, like the Surprise and the Hammer, they are naturally quite shapely, and are very difficult to prune, for the reason that Prof. Sandsten spoke of. If you let your branch grow to the length that you think it ought to be pruned, why, then you have that extent of limb out from the trunk to wherever you prune it, without anything on it, and the fruit buds will form on the new growth, and of course it gives the weight so much more lever, and I have never discovered any way to stop it.

Mr. Rowe. Pinching them back you will find will do this with the plum just the same as it does with the black raspberry. If they come to a certain length, pinch out that when it comes out a foot or eighteen inches, wherever you want it, you will find it will throw out and fill right up back, if it is early in the season when your wood is young and tender and they fill out that branch back there with limbs.

Mr. Marshall: That may be practical in an orchard, but I have my doubts of it in an orchard of native plums. But at the suggestion of Mr. Hale I cut back at the time the terminal bud formed; he said that was practical, had been successful in his orchard in Georgia with the Burbank and the other Japan plums, and I have tried it on for two years now on 100 trees and I cannot see that it is any better than the winter pruning.

Prof. Beach: Did you find a difference in the habit of the different trees of the same variety?

Mr. Marshall: Some, not very much however. Take trees like the Wyant and Quaker and the Brittlewood, and you never can tell what they are going to do, or where they are going to jump, they will go almost any way. The Brittlewood I think is one of the worst of the native plums.

Prof. Beach: Would it not improve the variety of plum you wish to grow, suppose it was the Surprise, to take the buds from the most shapely tree?

Mr. Marshall: Well, the Surprise has most shapely trees.

Mr. Toole: I have a few plum trees, have been pruning at them for several years, young trees, and possibly I have not pruned them long enough to get scared about it, and the difficulty with these trees is making the rapid growth, and then, as has been mentioned before, if you do any pruning on these low

sprouts they will invariably string out at the tops; the consequence is, you have long, slender twigs on the tops of the trees and the trouble of breaking down will occur. I cut back not less than two-thirds of the growth. Some will say that I cut back too much; my experience is that if I cut back two-thirds I am not cutting enough rather than overdoing it, and you may feel as though you may have a very brushy tree in a very short time. If we have a few branches in there and they can easily be taken out while they are young, if the tree has a tendency of throwing twisted branches, as the Wyant does, such branches are easily taken away, and as soon as the tree gets to fruiting you do not have the excessive growth, and the tree that you thought was going to be so very full ceases to get out of shape.

Mr. Marshall: I do not want to have any misunderstanding. I do not say that the native plum tree cannot be made to grow the way and shape you want it to, but what I have been looking for for years is how to do that economically, so that it will be practical in a commercial orchard of 2,000 or 3,000 trees. If a man has a few trees he can devote time to them that he could not afford to devote where he is growing them to any extent at all.

Prof. Sandsten: That idea that I want to bring out is not pertaining to the bearing period, but to the formative period. It takes care of itself after it gets into bearing, the wood growth is not very heavy, and the tree takes care of itself.

Mr. Fales: The professor advises quite a low-headed tree. That is all right to a certain extent, I believe in a medium low head, but we do not advise as low as he does.

Mr. Rowe: We have found that the upright growing trees we can head very low, but the spreading trees of the Wolf River type and that class of trees we want to start high, because we can never keep the limbs off the ground, so it depends on the variety where we want to place the head.

Mr. Goodman: I want to say just a little right here, because we have had to train so many thousands of trees and have come to just this conclusion. In all apple orcharding the first year you have a spreading tree, the second year, if your tree is right, you have your branches cut out at right angles; you will find that in any good two-year old tree, if you shape those trees well, start out in the one year old, those branches will start out at right angles and you have plenty of those. Now, if you prune that tree, if you leave your center shoot straight down, cut those

branches aside and make them head 18 inches or two feet—we never head over two feet, rather 15 to 18 inches—and then next year you will have shoots from each of those side branches, and this main shoot, let it continue on and you will have branches come out at right angles there, and in three years you will get that head and that tree formed so that there will be no crotches at all, as long as you keep that center going up like an evergreen tree, just an example of what we keep in mind always for the first three years in growing that tree, with the center shoot always leading and the branches at right angles as much as possible. If a branch comes out like your two fingers, this way (indicating) we either take that off close to the tree, or we cut it back and leave a couple of inches, just two buds only, so as to make it come at the branch, and leave this one, two or three feet long and take this one off (indicating), just simply leave a couple of inches, and if you follow that for three years you will invariably get your trees without any crotches at all, because you have your center leader which will follow the same as it will in a spruce tree. Now, it does not make any difference whether that tree is Rhode Island Greening or Winesap, or an upgrowing tree like the Red June, it does not make any difference in after years, ten or fifteen years, if you find your tree is too low to the ground, you have got enough anyway to take off there; but just like the forest tree establishes its branches below because they will come off, they are little stem shoots; you can cut the lower branches off some Norway spruce trees with a very little care, and they are kept in that way so that in after years you can raise the head as you determine to do it. We in the south do not want to do that, but you in the north want to do that. But for the first three years, if you will have your ideal tree with the center shoot, and get your branches at right angles from that center shoot, and follow that plan every year, to see that your leader gets the advantage, keep all the others back for this leader, then you will have no forks in your trees. I do not mean by that that you will find all our trees that way, but you will find a great many of our trees that way, because we cannot follow all of them so closely as to keep that ideal, but we do follow that ideal tree for the first three years, and we scarcely ever have a fork, but if we do have a fork, we bore a hole and put an iron nut through and bolt it.

FAITH, HOPE AND CHERRIES.

A. L. HATCH, Sturgeon Bay, Wis.

I have been actively engaged in horticultural pursuits in Wisconsin since the spring of 1869. In that time I have grown considerable qualities of about all kinds of fruit grown in the state. Of them all the cherry is my favorite. When we made our first plantings of fruit trees at Sturgeon Bay they included a liberal quantity of cherries. Prof. Goff and I had faith in the Door County Peninsula for certain kinds of fruits and our hope was that we might show how fruit growing there could be made profitable. In cherry culture at least, our faith and hope have been pretty fully realized as several years of success amply shows.

While our success is largely dependent upon the climatic conditions of the Sturgeon Bay region, its soil and environment, we wish to state that our efforts there have been confined exclusively to development and in no sense have they been of a speculative nature. Nor shall I exploit the region in any way but what I know it richly merits as a natural vantage ground for the upbuilding of a splendid industry of which every good citizen may well feel proud.

One reason why the cherry has proven so good for us is because it is not so exacting of particular care at all times as most fruits are. Relieved of its fruit burden in midsummer it has the balance of the season to recover from the effects of the crop it has borne. Although I have had trees bear heavily, with a single exception, I have seen none that have suffered from over-bearing. This is more than I can say of plums or apples many of which are quite ruined by the loads of fruit they are allowed to bear some seasons. While it is often necessary to thin the fruit of the apple and plum I have not found it necessary with the cherry.

The harvest of the fruit early in the season eliminates about one half the risks of injury from winds, hail etc., that trees carrying their fruit the whole season must assume. This early harvest is also a decided market advantage, as the fruit does not compete with the usual flood of fall fruits and therefore sells at far better prices.

Another and excellent feature is the early and continuous fruitfulness of the trees. As soon as the trees become established in the orchard and have made sufficient growth of branches they begin to bear and keep it up year after year if well cared for. Two or three sprayings with Bordeaux mixture with a little arsenical poison added seems to control fungous diseases and insect troubles. Indeed, as far as insects are concerned we have had no cherries injured and that is more than we could ever say of plums or apples no matter how much we sprayed.

Still another reason why we like the cherry is because it is easy to get the fruit picked. The children and women we employ seem to like the work and as they make good wages at it the harvest is more like a jolly picnic than hard work as far as the picking goes.

Of the advantages for cherry growing possessed by the Sturgeon Bay region one of the most marked is the effect of the mild temperature of the growing season. The excessive heat both night and day experienced in the interior of the state away from the influence of the water is scarcely known at Sturgeon Bay and as a result our fruit is firmer, less likely to decay, and ships better. About the close of the cherry season Prof. Sandsten visited our place and expressed his surprise at the excellence of our cherries, declaring them superior to those he had seen elsewhere. We hope this will come to the notice of some enterprising young man who will come to Sturgeon Bay and establish a cannery for putting up our fruit in glass to the end of not only producing a strictly high grade and fancy product but also to establish a permanent and paying industry. Already the field is sufficiently large and growing to warrant such an establishment.

In giving figures of cherry growing at Sturgeon Bay, I wish to say that my own yields have been duplicated in degree by several other growers and are likely to exceed in the future as my own plant included some kinds I would not plant, notably Dyehouse and Wragg. The latter is wholly unworthy of culture in our locality. Where the plantation consists of half each of Early Richmond and Montmorency the best results may be expected as far as kinds go.

The whole crop of cherries grown at Sturgeon Bay last season was about six thousand cases of which my own crop was

twenty two hundred crates, which is probably the largest crop of cherries grown in Wisconsin by one grower. For the first time in my life I last season suffered a loss from a severe rain with very fine hail that damaged my Early Richmond as they were just opening and soft enough to be hurt by the fine hail. This loss I estimated at fully 25% of my whole crop and yet the balance sold for a little over \$2,000 which is by no means a poor revenue for eight acres. The years previous I had 425 bushels that sold for about \$900; the year before that my crop was 450 bushels and sold for over \$1,400 and besides I had over \$100 worth of other stuff from the same ground, that being the last crop grown besides the cherries in the orchard.

There is one feature of fruit growing that has always been a source of satisfaction to me. And this is one in common with fruit growing everywhere and is well worthy of consideration as regards our influence as citizens of the state. In picking the fruit we grow we give profitable employment to children and women that profoundly influences their lives. While I have satisfaction in knowing that the \$400 I paid out last season for that purpose bought many comforts and necessities into needy families it also was a means of demonstrating to the children their ability, to do, to earn and accomplish, thus giving them a start in the business of getting a living. I have often thought that a child once started as a wage earner can never become pauperized except by calamity, but has acquired at least one trait of good citizenship that of manly independence. I fully believe that fruit culture has a tendency to improve communities and if it can be made to yield a good revenue it is upbuilding as a home making influence.

As far as cherry growing is concerned it has passed the experimental stage at Sturgeon Bay and is now an established industry. We had faith and we planted: we had hope and we cultivated: and because of our faith and hope so manifested, we got cherries!

FIRE BLIGHT AND APPLE TREE CANKER.

H. H. WHETZEL.

CANKERS. WHAT THEY ARE.

During recent years several kinds of cankers occurring especially upon apple and pear trees have been described and figured in bulletins from different experiment stations in this country. By careful inoculation experiments these various cankers have been shown to be due to different species of either fungi or bacteria. Some of these canker diseases are peculiar to certain regions only, others are more cosmopolitan and are apt to be found wherever apple or pear trees are grown. Growers very generally even at the present time attribute such injuries to "sun scald" or "freezing." Lack of knowledge of the nature of fungous and bacterial growths, together with the ease with which responsibility may be shifted upon the weather, has made this opinion the common and natural one. Not only have experiment station workers shown that these injuries are usually due to the attacks of living organisms rather than to the results of weather conditions, but they have demonstrated that the different forms of these cankers are due to distinctive different organisms.

The term "canker" then has come to be a very general one and is applied to diseases which cause the death of definite areas of bark on the limbs and bodies of trees. The diseased area may be smooth and sunken or enlarged and roughened depending upon the nature of the organism causing it. At least six distinct canker diseases of apple and pear trees have been described and figured in recent years. Among these may be mentioned the European canker, very destructive in Europe, not only to apple and pear trees but also to certain forest trees. It also occurs in this country: The New York apple tree canker, very abundant and destructive on apple trees in western New York, the bitter rot canker of the Mississippi valley and the black spot canker of the Pacific coast. Each of these cankers have been proven to be due to distinctive different kinds of fungi. In this paper, however, we shall deal with a canker disease, not caused

by a fungus and differing strikingly from those already mentioned. To this disease I have given the name of blight canker.

The history of this disease in this country covers a period of at least 135 years, having probably first been observed in the highlands of the Hudson in 1770. Its true nature does not seem to have been suspected, however, until 1880. In that year Professor T. J. Burrill of the Illinois State Experiment Station while working on the fire blight of pears and apples came to the conclusion that the so-called "sun scald" spots on the bodies and larger limbs of apple trees were due to the same cause. At a meeting of the Illinois State Horticultural Society in 1881 in answer to a query regarding the nature of "sun scald" he said, "The sun scald on apple trees is the same as pear blight." Similar statements of Professor Burrill upon the same subject are recorded in other places. Upon what experimental evidence if any this and other statements were based I have so far failed to discover. A number of writers since that time have referred to these cankered patches as "body blight" due to attacks of *Bacillus amylovorus*, but none seem to have actually produced the cankers by the introduction of the bacteria into the bark of healthy trees.

THE DISTINGUISHING CHARACTERS AND APPEARANCE OF THE CANKER.

The blight canker while it may occur on trees of almost any age is most destructive on young trees just coming into bearing, trees from 8 to 15 years old. In some sections of the state of New York, notably the upper Hudson River Valley, at least 95% of the trees of this age show cankers on limbs or body. A very large per cent of the affected trees are dead and the remainder are fast succumbing. Very noticeable throughout this section also were the large number of trees with cankers in the crotches where the main limbs arise from the body. Old trees weakened by age and neglect may suffer seriously from its attacks and the dead limbs protruding here and there from the green foliage in old orchards are often to be attributed to the ravages of this canker.

In young trees with smooth bark the cankers are easily detected even in their first stages. They appear as discolored and somewhat sunken areas, the margin along the advancing front being usually slightly raised or blistered. The tissue in actively



A typical blight canker upon the body and main limbs of a young apple tree.



A small pit canker on the limb of an apple tree.



Typical canker formed around a pruned stub, probably infected by means of the pruning knife.



Pit cankers upon the body of a young apple tree. The repeated spreading of the disease year after year has gradually enlarged the original canker until it has become a dangerous wound.



Badly cankered crotches of young apple tree. Cankers also running up the main limbs.



Canker in the crotch and body of a pear tree. Produced by direct inoculation from a canker on the body of an apple tree.



Canker formed around the mouth of an insect burrow at the base of a young apple tree.

spreading cankers is of a darker green than the healthy bark and is very watery or sappy. On damp cloudy days drops of a milky, sticky fluid exude from the cankered tissues through the lenticles or pores in the bark. After a short time the diseased tissue begins to turn brown and dry out. Unless in a very active state of progress the margins are quite distinct, marked by a crack where, in drying, the diseased tissue has separated from the healthy bark. The older cankers are brown, somewhat darker than the healthy bark. They are distinctly sunken. The surface is smooth, never checked or roughened or beset with pustules or pimples, except in the old cankers where after a time rot fungi gain entrance and thriving in the already dead tissue produce their fruit bodies on the surface. The progress of the spreading canker depends largely upon the continuation of favorable weather conditions, which seems to be a *humid atmosphere and cloudy days*. With the return of bright, sunny weather the active spread of the canker is checked abruptly often to be resumed again with the return of favorable conditions. This checking and renewing of activity sometimes results in large cankers with concentrically arranged cracks within the cankered area. This renewal of activity may take place during the same season or the canker may partially heal over to spread anew the following year. A large per cent of the cankers are active during but one season. There are always some, however, in which the disease is perennial, living through the winter to become active again the following spring, spreading and enlarging the original limits of the cankered area. Wait distinguishes these when occurring on pear trees as "hold over" cankers. The diseased bark is usually killed to the wood to which it clings tenaciously the first season. It gradually decays, however, and falls out leaving the wood bare and exposed. In small cankers, the cone of diseased bark may be quickly forced out by the rapidly forming calluses which heal and close the canker wound. In some cases the canker is superficial, never reaching the cambium except perhaps in a limited area at the point of infection. Such wounds heal quickly beneath the dead bark which clings to the tree as a sort of scab.

The cankers vary in size from half an inch in diameter to as much as a foot or more in length and several inches across. On healthy, vigorous trees they are small and more or less circular in outline. They form funnel-shaped wounds with the small end at the cambium. These I have designated as "pit cankers." Google

Often the dead bark remains as a sort of lid to the pit but it is easily removed with the finger or a knife blade. I have seen young trees with limbs and body literally covered with these pit cankers in all stages of healing over. Aside from affording an entrance to rot fungi such cankers unless they enlarge do not seem to seriously affect the health of the tree. In many cases these pit cankers do not heal properly or at all and the disease spreading the same or the following season forms the large and dangerous "limb" or "body cankers."

"Crotch cankers" usually appear in the crotches where the main limbs arise from the body but may also appear in the secondary crotches well up in the tree. In general characters they are similar to the limb and body cankers. Owing to their peculiar position water is retained more readily in the dead bark, thus affording the very best of conditions for the entrance and growth of rot fungi. These find easier access to the heart wood at the crotch than on the limbs. It was observed that these crotch cankers heal much less readily and successfully than do the limb and body cankers. Crotch cankers unless promptly attended to means the almost certain destruction of the trees.

The large cankers at the bases of young trees frequently referred to by growers as "collar rot" are in many cases very probably due to the same cause as that of the cankers on the upper parts of the tree. The well known "collar rot" of King trees may also be due to the same or a similar organism.

DISTRIBUTION AND SEVERITY OF THE DISEASE.

Since the first specimen of the blight canker was received from the upper Hudson river region early in the summer of 1904, evidence has been constantly accumulating that points to a very wide distribution of the disease. Numerous trips during the last two seasons have convinced me of its very general occurrence throughout the state of New York. Practically no orchard of any size visited has been without some trace of it.

Certain sections have suffered much more severely than others. The accompanying map shows the regions known to be most seriously affected. No doubt other localities have suffered as severely as those indicated but limited time and funds at disposal for this work have made a more extensive survey impossible.

In the Hudson river valley north of Albany the canker has destroyed nearly every young orchard. Throughout this sec-

tion a number of orchards were set some ten or twelve years ago. These were just coming into bearing when the disease began to appear in alarming severity. At first only a few trees died here and there in an orchard but by 1904 the loss had in many cases reached more than 50% and a careful examination of several orchards showed that not less than 95% of the trees were affected. All along the line of the trolley north of Albany and about Saratoga the dead and leafless branches of the young apple trees bore witness to the destructiveness of the malady. The severe winters of 1902-3 and 1903-4 no doubt seriously affected the vitality of the trees, rendering them especially susceptible to attacks of the blight organism. The constant occurrence of the cankers indicate, however, that they were the chief factors in the death of the trees. No dead or dying trees in the young orchards were found that did not show cankers. In one orchard of originally some 400 trees which began to go out in 1903 less than 50 were still alive in June 1905 and but a few of these were entirely free from the canker. The old orchards in this section have also suffered considerably from this same malady and pear trees have almost entirely gone out.

In certain sections in the central and northern part of the state the disease also became epidemic about 1903. The summer of 1902 was a very rainy one in these regions offering the very best of conditions for infection and development of the cankers. No doubt many of them appeared during that time but passed unnoticed by the ordinary grower until their baneful effects began to show in 1903. A few active cankers were, however, noted on trees here and there in these badly diseased orchards. The force of the epidemic seems to have spent itself by the end of 1903, the completing of the destruction being effected by the rot fungi that had gained entrance to the heart wood through the canker wounds.

An examination of the young orchards about Ithaca show a large per cent of affected trees but as yet the disease has not occasioned serious losses. In an orchard of about 350 trees which has been under observation throughout the past season about 85% of the trees show cankers while the actual number of dead trees resulting from its attacks has not exceeded five per cent. It is on the other hand a significant fact that a very large proportion of this five per cent has died during the past summer, showing that the disease is slowly increasing in severity and only awaits a favorable opportunity to become epidemic. 

The canker is not confined to New York alone. Reports and specimens from different places indicate that it is more or less common in New Jersey, Delaware, Kentucky, Kansas, Iowa and Wisconsin. What is doubtless the same disease is also reported from Canada. In fact it is safe to say that wherever the "twig blight" form of the disease occurs the "canker" form on limbs and body is more or less common. A study of horticultural and agricultural literature shows that the disease has been destructive not only in nearly every apple growing region of the United States and Canada but also in Europe as well. During the period from 1878 to 1888 this disease under such names as "body blight," "sun scald," "freezing," etc., formed one of the chief topics of discussions in most of the horticultural meetings of the middle west. Conservation and correspondence with fruit growers from various sections of the Mississippi valley during the past year convince me that this region still suffers as severely from ravages of this disease as it did 25 years ago.

HOW THIS CANKER DIFFERS FROM THE NEW YORK APPLE TREE
CANKERS.

The New York apple tree canker described by Paddock in Bulletins No. 163 and No. 185 of the N. Y. (Geneva) State Experiment Station, is very abundant and destructive in many orchards, not only of the state of New York, but of other states as well. Specimens of this canker have been received during the past season from Iowa. It is caused by a fungus and is in most respects very different from the blight canker with which nevertheless it is frequently confused. The chief differences between the two are set forth in the following parallel columns:

NEW YORK APPLE TREE CANKER.	BLIGHT CANKER.
Caused by a <i>fungus</i> . Usually found on the main limbs of <i>old</i> trees.	Caused by <i>bacteria</i> . Occurring most frequently on the body and limbs of <i>young</i> trees just coming into bearing.
Diseased portion more or less <i>swollen</i> , cracked and roughened.	Diseased area <i>sunken</i> and smooth, not cracked and checked.
Cankered surface <i>black</i> .	Cankered surface <i>brown</i> .
Covered with <i>minute black pimples</i> —the fruit bodies of the fungus; often not so evident in old cankers.	Not showing any <i>pimples</i> or <i>fungus fruit bodies</i> , except in old cankers that have been invaded by <i>saprophytic forms</i> .
Freshly cankered tissue dry.	Freshly cankered tissue, watery.
Cankers <i>perennial</i> , i. e., living over and spreading from year to year.	A large per cent of the cankers <i>active but one season</i> .

HOW THE DISEASE AFFECTS THE TREE.

The effect of the Blight canker upon the tree is to lower its vitality to a greater or less degree by cutting off the food supply to the roots and thus indirectly reducing the flow of sap to the branches and leaves. In other words it acts the same as "girdling." The "collar rot" and "crotch cankers" seem to be the most fatal to the tree. The effects of the canker are first evidenced in the foliage. If there is a large body canker the entire tree may show the effects of the trouble. More often the first symptom noted by the grower is the peculiar appearance of the foliage on one or more of the limbs. Either these branches fail to leaf out at all in the spring, or if they do the leaves never fully expand but remain undersized and curled or inrolled. They never take on the dark green color of healthy foliage, remaining pale and gray. Growers often refer to such trees as having "mouse ear" leaves. As the season advances and the cankers spread, the leaves often die and dry up on the branches. Sometimes badly affected trees will pull through until autumn or even live for two or three seasons. Such trees have scanty foliage, blossom profusely and frequently set a heavy crop of fruit. This fruit falls prematurely or is small and inferior in quality. The picture before you shows a large body canker at the base of one of the main limbs on an old tree. The canker had nearly girdled the limb. This spring the branch was loaded with blossoms to the exclusion of foliage while the other limbs of the tree bore a normal quality of flowers and leaves. Such affected limbs and trees as if in anticipation of their approaching death seem to devote their expiring energy in one grand and final effort to reproduce themselves.

Where the trees are strong and vigorous they frequently succeed in promptly healing the canker wounds. The dead bark of the canker makes, however, an excellent infection court for the entrance into the tree of "heart rot" and other decay inducing fungi. Moisture so necessary to the germination and growth of the spores of fungi, is retained for a considerable time in the dead tissue. This is more especially true of crotch cankers. No doubt these rot fungi are often to blame for the final death of the tree. The heart wood of badly affected limbs and trees is commonly found to be soft and rotten with only a thin rim of sound sap wood surrounding it.

THE CAUSE OF THE CANKER.

A microscopic examination of the viscid milky drops that exude from freshly cankered surfaces on moist cloudy days will show them to be composed almost entirely of minute rod-shaped bacteria. The diseased tissue within the bark will also be found to be alive with these minute plants. By their rapid growth and multiplication within the cells of the bark they cause its death. When the canker dries down they die and disappear so that examination of the tissue of old cankers does not show them. That they are the direct cause of the disease was proven in the following manner: Bacteria from the cankered tissue was introduced into the bark on the body of a healthy apple tree and also into the bark of a healthy pear tree, with the result that typical cankers appeared in both cases. Blossoms and growing twigs of both pears and apples were also inoculated with bacteria from this same canker. These nearly all developed good cases of blight in about ten days, while twigs and blossoms punctured with a sterile needle gave no infection. This last experiment was twice repeated during the summer with pure cultures of the bacteria from the apple tree canker. The blight resulted in practically every case. Young fruits of both the pear and apple were also inoculated and gave well developed cases of the disease. By a comparative study in various culture media of the bacteria from cankers, twigs and fruits of both pear and apple obtained from different orchards about Ithaca the organism of the canker was shown to be identical with that of the well-known "Fire Blight" of the pear and "Twig Blight" of the apple, *Bacillus amylovorus*.

HOW TREES BECOME INFECTED.

Much of my attention while in the field during the past season has been directed to a solution of the problem of how the bacteria gain entrance into the tree. Only those ways of infection which personal observation has discovered are here recorded. No doubt the bacteria enter the bark in still other ways than those I have observed.

Early in my investigation I came to the conclusion that the bacteria frequently get into the bark of the limbs and body by way of short spurs and watersprouts (Fig. 25). The opinion

was fully confirmed later in the season. Twig blight became very prevalent during July and August, especially in the region about Ithaca. It was then an easy matter to find blighted spurs and watersprouts with active cankers about their bases. Where these watersprouts grew out from the trunks as is often the case in young trees, typical body cankers were formed. The infection of the sprout itself is generally attributed to the work of insects which after visiting freshly cankered spots or blighted twigs introduce the bacteria into the succulent tissues of the rapidly growing healthy shoots. The blighted watersprout soon dried up and falls away leaving often a very indefinite scar in the cankered area so that the following season it is usually impossible to tell with certainty the manner of infection. Observation of a large number of trees, during the past season convinces me that the blighting of adventitious shoots on trunk and limbs is responsible for a majority of the cankers in such locations. A number of cankers were produced in this way by artificial inoculation.

Another source of infection was found to be the pruning knife. Along one side of an orchard of some 350 trees which was under observation throughout the season, it was early noticed that the pruned stubs of 1904 especially, showed collars of dead bark often two or three inches in width. Instead of forming a callous and healing over the wound as would normally occur, the tissue had died and shriveled up but still clung to the stub. In most cases the bacteria which had caused the death of the bark had died out the first season. In a few instances, however, the cancer was observed to be active early in the spring, extending down the side of the adjoining limb. Two badly diseased trees on this side of the orchard seem to have been the source of infection. Owing to their diseased condition they had been severely pruned the previous season and very probably the knife or saw had carried the bacteria to the healthy trees. Flies which were observed to constantly follow the pruner to suck up exuding sap may have been the direct agents in many cases in transferring the bacteria. Wait states that flies are the pioneers in the distribution of pear blight in the spring. The knife itself may convey the disease as is shown by the following incident. While making inoculations into the body of an apple tree on the station grounds, I had occasion to remove from near the base, a large sprout of several years' growth. This I did with my

knife which I had but shortly before used to cut bark from a fresh canker. A typical canker soon developed about this pruned stub.

Of a similar nature are infections that occur through wounds or bruises on the limbs and bodies of trees. These wounds, commonly known as "barking" may be made by careless workmen when plowing or working about the trees or from the gnawing of animals, one of the worst of which in New York is the woodchuck. A large per cent of such wounds heal over eventually but frequently through the agency of insects or other means these wounds serve as infection courts for the canker bacillus. An interesting case of wound infection came under my observation this season. In cutting a cankered branch from a tree I accidentally "barked" a healthy limb with the cut end of the diseased branch. The tree was not again visited until some weeks later when a large and actively spreading canker was found to have developed about the abrasion. The bacteria were found in abundance in the diseased tissue and pure cultures obtained.

The wounds or punctures of insects seem to be directly responsible for some of the infections. Occasionally cankers on the bodies of trees cannot be attributed to infection through blighted shoots. In some cases these cankers have been traced directly to the wounds made by insects. It is probable that many of the cankers at the base of young trees originated in wounds made by borers. One undoubted case of this kind came under my observation last summer. The bacteria are probably carried to these wounds by flies or other insects which visit these places to feed on the exuding sap and excrement. The infecting agents in the case of crotch cankers have not as yet been definitely located. It seems likely that insects are here again responsible.

As a general deduction, then it may be stated that infection occurs only through a wound of some sort. Moreover the infection court must be of such a nature that it will not dry out quickly. An abundance of moisture is known to be necessary to the rapid growth and development of the blight organism. This peculiarity accounts for the ease with which growing shoots are affected. Where the diseased tissue of an active canker was at once cut out and the wound exposed to the drying heat of the sun without any other treatment, the canker ceased to spread and the place healed rapidly.



Showing the effect of the cankers upon the trees, the foliage and twigs dead or dying.



The bacteria causing the blight canker. These are the same as the bacteria causing the fire blight of pears.



Showing the most serious centers of the blight canker disease in the state of New York.

TREATMENT THAT PROMISES BEST RESULTS.

Although the work of the past season has been devoted largely to a study of the various manifestations of the disease, its cause and distribution, still some attention has been given to the means of combatting it. Through the kindness of several growers I have had the opportunity of carrying on some experiments along this line on their trees. Prevention rather than cure is one of the axioms of plant pathology. In most cases the curing of a diseased plant is impossible or its value does not warrant the effort required to save it. However in the case of trees just coming into bearing it seemed that if possible some means of saving them should be worked out. Several things were accordingly tried but the one that so far gives most promise of definite results is to *cut out the cankers*. With a sharp knife remove all the diseased tissue, swab out the wound with a solution of corrosive sublimate (one tablet to one pint of water) or with a 3% solution of copper sulphate (1 oz. to 2 gallons water) and when dry paint over thoroughly with some heavy lead paint. This should be done early in the season as soon as the cankers are discovered, for two reasons: 1st, the spreading of the canker and its consequent damage to the tree is stopped; and 2nd, the wound is thus given a long period in which to heal. The painting should be repeated again toward the close of the season and again the next year or until the wound has completely healed. This prevents a second infection or the entrance of rot fungi. A bi-monthly inspection of every tree should be made and all cankers carefully cut out and treated as soon as they appear. Cankered trees so treated early in the spring of 1905 have formed good calluses and are fast healing the wounds. Practically this same method has been used for some time by Wait in combatting the pear blight. He states that the cheapest and most satisfactory way to control pear blight is to cut out and treat, as I have described, all the "hold over" blight during fall or winter, before sap starts in the spring.

PREVENTATIVE MEASURES.

It is scarcely necessary to point out that every precaution should be taken to prevent bruises or injuries of every sort since these make excellent infection courts for the entrance of the bacteria.

All dead limbs and trees should be promptly removed from the orchard and burned. Old pear trees in the neighborhood of young apple orchards are often a constant source of infection and unless kept absolutely free of the blight should be removed. A neighbor careless in respect to blight in his pear trees is a dangerous one.

Cut out and burn every trace of twig blight from both pear and apple trees as soon as it is detected.

When pruning, treat all cut surfaces with the corrosive sublimate or copper sulphate solution and keep them painted until healed. Treat all accidental wounds in the same way.

Keep the body and main limbs of the tree free of watersprouts throughout the summer.

In planting, select trees with open or spreading crotches.

Avoid excessive fertilizing with nitrogenous manures. Apply some form of phosphoric acid to ripen new growths.

The planting of varieties known to be more or less resistant to this disease is to be recommended. The Wolf River and Talman Sweet appear to be of this sort, while Baldwins and Ben Davis suffer most severely. Desirable non-resistant varieties may be top grafted on to resistant stocks.

A WINTER INDUSTRY FOR FRUIT GROWERS AND MARKET GARDENERS.

PROF. J. G. MOORE.

Winter on a fruit farm or vegetable farm is a season on which the operator finds himself more or less out of employment or at least with considerable spare time on his hands. Many growers would be only too glad to turn this time into money, if some way, not too foreign to their occupation, could be found for so doing. It is the object of this article to point out a method of securing both pleasure and profit during the long winter season without diverging from the path of true horticultural pursuits. The means of doing this may be summed up in either of the two terms, "Vegetable Forcing," or "Growing Vegetables Under Glass."

The winter forcing of vegetables as a commercial project is of comparatively recent origin, but since its innovation, its growth has been remarkably rapid. At the present time it forms the sole occupation of a large number of men in the vicinity of our large cities and is extending itself even to the smaller ones. Some localities are especially adapted to the forcing industry and in these places establishments using thousands of feet of glass are now in operation.

The subject of growing vegetables under glass is an extensive one and can be treated only in a superficial way in the time allotted to me. As we are concerned with forcing throughout the entire winter months, we must pass over all the minor means of growing vegetables out of season and consider only the forcing house as a means of producing the crops to be grown.

Before doing this, however, let us first consider the probabilities of success in such an undertaking. In the first place, can a man who grows winter vegetables find a market for his product? To this there is but one answer—"yes." To the fruit or vegetable grower who takes up forcing as a winter occupation, there is open two means of disposing of this product—the wholesale market and that afforded by his local market. Where the grower is situated near a city of 5,000 or 10,000 inhabitants, the local market will doubtless prove the more satisfactory.

Take, for example, Madison. There is a fairly good demand for winter vegetables here, yet there is not an establishment in the city which makes an attempt to supply this demand, and the grocers are obliged to ship their products from Milwaukee or Chicago. Nor is the present demand what it should be, for with a local grower, the grocer could be induced to push his products, with the result that the demand would be greatly increased. Madison could well, with a little education in the use of winter vegetables, furnish an outlet for five or six establishments as large as the ordinary fruit or vegetable grower would care to operate. Of course the establishments would necessarily have to handle different vegetables.

What can be done in Madison is only an example of what can be done on a larger or smaller scale in a number of cities of the state. There are in Wisconsin twelve cities with a population of between 5,000 and 10,000; six with 10,000 to

15,000; and fourteen with over 15,000. These thirty-two cities ought and doubtless would, when once a good product was offered regularly, use all the vegetables which the fruit and vegetable growers present, and a large number of others would force, if each had a fair-sized establishment.

Almost the first question which presents itself when one considers entering upon a new project is the amount of capital involved and the probable returns on the investment. For the establishment which the fruit or vegetable grower would care to install the necessary investment would probably not exceed \$3,500. Estimates secured from such firms as John C. Moninger and the Foley Manufacturing Company of Chicago, place the cost of constructing a modern forcing house, and piping the same, at from \$12 to \$14 per linear foot, with an additional cost of from \$300 to \$500 for a heating plant, if steam is used. Thus if a grower wishes to start with two houses 100 by 20 feet, the maximum investment would be in the neighborhood of \$3300. A boiler sufficiently large to heat eight houses would cost about \$500 and thus the establishment could be enlarged from time to time, as desired, without additional cost for a heating plant.

What could the grower expect in the shape of returns upon this investment? It is evident at once that this will be determined largely by the market, but on the average certain returns could be confidently expected. The kind of crop grown also figures somewhat in the profits. Everything considered, with reasonable success, these two houses should return a net profit of from \$500 to \$700 annually, or in other words from 15 to 20 per cent on the investment. Nor have we taken into consideration that at the same time this is allowing the grower \$50 per month during the winter while he is looking after the house and the same amount per month to hire a man to look after them for the remainder of the time when the grower is too busy to do so. With some crops one man can care for a great deal larger area, while with tomatoes two houses 100 by 20 is about as large an area as one man can tend, especially at certain periods of growth.

The heating of houses is one of the factors which must be given a great deal of care if best results are to be obtained. Two chief methods are in vogue and each has its merits and advocates. These systems are steam and hot water.

ough discussion of the two systems is impossible at this time and we must necessarily be content with a summary of their chief differences. Steam possesses the following advantages over hot water: It is better adapted to crooked circuits; holds heat better and distributes it more readily and evenly; costs 15 to 20 per cent less to install and can be used in larger establishments. On the other hand, hot water surpasses steam in that it requires less fuel, breaks are less apt to occur, it lasts longer and requires no night fireman. There is no appreciable difference in the effects of the two systems on the plants, and consequently the answer to the question of whether hot water or steam shall be used in heating an establishment depends upon whether there shall be a larger cost at the start with smaller outlays for repairs, management and fuel and a longer lasting system or the reverse of these conditions.

Nearly all the vegetables are forced to a greater or less extent, but only four—the radish, lettuce, tomato and cucumber, have assumed much commercial importance. All vegetables which are forced are classed under one of two groups, cool or warm plants. This grouping is determined by the relative amounts of heat the vegetables require to secure the best results. Of the four vegetables just mentioned, two, the radish and lettuce, belong to the cool plants, while the tomato and cucumber belong to the warm plants. It will not be possible to discuss in detail how to grow each of these crops, but a few general principles may be given.

Cool crops require a temperature of 40 to 45 deg. at night, and of 55 to 65 deg. during the day. In addition to this the radish demands a goodly amount of bottom heat to give the best results. Too cool a soil causes slow growth and pithiness; too warm a soil forces the plants to excessive foliage production at the expense of root growth. In all cases houses must be ventilated even in the coldest weather.

Soils differ so much for the various crops that no definite statement can be made which will cover all. Lettuce, particularly the heading sorts, is very exacting in this regard. A soil which holds a goodly supply of moisture without baking or puddling is necessary. One which retains water in excessive amounts in the upper inch of soil is conducive to the lettuce rot, the worst pest which infests this crop. Non-heading sorts are less influenced by soil. A good garden loam with a liberal

supply, say one-fourth to one-third well rotted stable manure, produces very good results. Radishes demand a more sandy soil and yet one which is retentive of moisture. It should be fairly rich but should not contain too much nitrogen as this fertilizing element is apt to produce an excessive leaf growth.

Watering is one of the most important factors in growing crops under glass. The great tendency is to water too often. If the soil is kept in a proper condition of tilth, the upper surface of a bench may appear dry while the soil an inch deeper may contain a sufficient amount of moisture to answer the requirements of the plants. If water is given too frequently the soil is kept damp and soggy, air is excluded and the plants suffer as much, if not more, than if they were allowed to show slightly the effects of the lack of moisture before it is given. We make a practice of soaking the benches thoroughly when we apply water and then let them go for a period before giving a further supply. In this way we have been able to bring a bunch of lettuce into a marketable condition by the use of three applications of water. With the use of bottom heat in growing the radish, care must be taken that the under portion of the soil does not become absolutely devoid of moisture before the upper inch or so shows such a condition. With bottom heat it is possible to have the bottom soil of a bench dry and the surface soil quite moist.

The warm crops, tomatoes and cucumbers, require more attention than the cool crops. Their temperature requirement is from 60 to 65 degrees at night, and 75 to 85 degrees during the day. Bottom heat is necessary for the profitable production of either. Ventilate whenever the temperature reaches 80 deg. or above.

In soil requirements neither is as exacting as head lettuce. A rich garden loam—3 parts garden soil and 1 part well rotted manure—answers the purpose well. As soon as the plant comes into bearing liberal quantities of liquid manure are applied after the benches have been thoroughly watered. This manure is prepared by placing one bushel of fresh cow manure in a barrel and then filling the barrel with water. This fertilizer should be applied at intervals of 10 days. Both of these crops require training and hand pollination, the details of which are too numerous to discuss at this time.

The forcing of most vegetables is not as difficult as is gener-

ally supposed. Neither is it an occupation which invites a man who is not willing to put good hard work into it. Every crop which we try to force has several insect and fungous pests and a crop is produced only through continual vigilance, and the careful attention of an energetic and reliable man.

SPRAYING FOR POTATO BLIGHT AND ROT.

JAMES G. MILWARD.

The potato industry in Wisconsin is handicapped by three important enemies, namely, the early blight (*macrosporium solani*), the late blight (*Phytophthora Infestans*), and the common potato beetle. I shall confine myself entirely to some practical problems concerning the control of these three enemies.

First, what is early blight? The term "blight" is often very broadly used among potato-growers, even to the extent of calling any early withering of the vines blight. Early blight proper is caused by a semi-parasitic fungous, *macrosporium solani*. It seldom attacks the healthy vine directly, but gains entrance after the vine has become weakened by injury. Hence its prevalence during seasons of serious damage from the beetle. The appearance of yellow leaves and dark circular spots upon the foliage indicates the early presence of the disease.

Under favorable conditions this appearance may develop to the extent of giving the entire field a speckled and blackened appearance. The stalks turn yellow, grow spindly, and ripen prematurely several days in advance of the season. During unfavorable seasons for fungous development, the disease may exist unobserved during the period of most active growth, and later multiply rapidly at the expense of the forming tubers. A microscopic examination at this stage will show the presence of thousands of club-shaped conidia in the tissues of the plant. The name, "Early Blight," is misleading because its effects may be most noticeable during the months of August and September. It must be remembered also that the fungous does not attack the tubers directly, but the yield results in an inferior grade of potatoes, with a high percentage of culs.

Quite in contrast to early blight, late blight is caused by an active, virulent, parasitic fungous (*Phytophthora Infestans*). The disease is a native of the wild potato vine of South America and was introduced into Europe, early in the 19th century. In 1845 it swept over Germany and the British Isles as an epidemic, causing practically the loss of the entire crop. Due to its economic importance in these countries, the life history of the fungus, as far as it is now known, was early worked out by German and English horticulturists and scientists. The greatest advance toward the control of the disease has been made in this country in recent years, due in part to the production of efficient spraying machinery, suitable for large commercial plantations.

Moist, warm weather during the months of August and September is especially favorable for the development of the late blight fungus. Under these conditions, in two days' time, the disease may turn an apparently healthy field into a mass of putrefied and blackened vines. A most unfortunate feature of the disease is that it not only destroys the vines, but the summer spores may gain entrance to the tubers and cause serious damage from rot. The rotting of potatoes in storage, which is very generally attributed to the late blight fungus, is very likely due to bacterial causes. The relative importance of the early and late blight fungus to the Wisconsin potato industry, is not definitely determined. The loss from early blight is more steady and it is probable the disease does more or less damage every season. Late blight appears more periodically, but when it is present, it causes more serious damage to the yield.

The success of any commercial spraying venture depends upon the efficiency of the selected fungicide in controlling the disease and upon the actual increase in profit, which can be realized above the cost of treatment. In New York state several potato growers are co-operating with the experiment station to determine the profits under actual farm conditions. A report of that work for 1905 estimates the cost of each application at 90 cents per acre. They obtained an average increase of 58 bushels per acre, which netted an average profit of \$22 per acre. Later reports indicate that potato spraying has made rapid progress in that state and is becoming quite general among the progressive growers.

Probably no spraying operation of the horticulturist or gar-

dener can be accomplished as rapidly, as cheaply, and as efficiently as can potato spraying. The machines have reached a high grade of perfection, making it possible for two men and one team to cover thoroughly about 25 acres in one day. Also, combining a poison with Bordeaux mixture not only facilitates in controlling the bugs, but also divides the cost between the two treatments.

One of the results of the potato spraying agitation will be the introduction of better methods in fighting the beetle. Serious loss resulted in the state last year, due to the clumsy and careless methods of applying Paris green. The past season's experience shows that Paris green applied with water is a failure. In several potato districts outside the state home-made arsenic compounds seem to be supplanting Paris green. These will undoubtedly be combined with the Bordeaux next season in Wisconsin for the control of the beetle.

Wisconsin is the second state in the union in potato production. During a normal year the crop approximates 30,000,000 bushels. Last year that yield was probably reduced one-half, due to a combination of the causes I have mentioned. The year proved a favorable one for practical field demonstration, under ordinary farm conditions. The season proved conclusively that a timely, intelligent application of Bordeaux mixture will prevent the blights to which the potato vine is subject. The profits realized above the cost of treatment were highly gratifying. Statements regarding the cost of treatment, time and number of applications, and profits, will seem less arbitrary, if brought out in the discussion.

Potato spraying gives promise also of arousing the farmers along the more general lines of improving the industry. In many localities the crop suffers severely from drought. Continuous cropping to potatoes in many sections has reduced the fertility and water-holding capacity of the soil. The greatest progress in the potato industry will result in combining spraying, with more rational methods of conserving the soil fertility. This will mean that the potato grower must introduce stock raising more generally into his system of farming, combined with a rational use of commercial fertilizers. The bugs and blight may drive the careless grower out of the business, but the successful grower may find *these* the indirect source of his profit.

REPORT OF FRUIT GROWERS' EXCURSION TO SOUTH-WESTERN TEXAS.

E. P. SANDSTEN.

Early last year I received an invitation from the officers of the "Cotton Belt Railroad" to join a fruit growers' excursion from St. Louis to southwestern Texas. Through the kindness of this society I had the pleasure of joining the excursion at St. Louis June 22nd. The party was made up of delegates from practically all the middle and eastern states. The object of the excursion was to make the fruit growers and horticulturists in the aforementioned section acquainted with the great possibilities afforded, by the favorable soil and climatic conditions of southwestern Texas, for the growing of peaches and early truck crops.

The excursion was timed so as to reach Texas in the height of the peach harvest, in order to give the party a chance to see the country at its best. I may say that in this respect the excursion was a failure for we arrived at least a week or ten days before the opening of the season and we were thus deprived of seeing and judging of the quality of Texas peaches.

A special train left St. Louis at 8:30 P. M. and we arrived at Jonesboro, Arkansas, at 9:00 the following morning, where we had breakfast. During the day we traversed through the whole state of Arkansas and all of us were forcibly impressed with the story of the Arkansas traveller. The section of Arkansas traversed by the "Cotton Belt" railroad is almost level, in fact so level that drainage in some instances appeared to be impossible. The soil appeared to be of a clayey nature with some sand in it, but devoid of humus and generally poor. The principal crop grown is cotton, which did not look very promising. Only a relatively small portion of the land is under cultivation, and with few exceptions the farm buildings and negro cabins corresponded with the general aspect of the country.

We were to have taken our dinner at Texarkana—a city deriving its name from the fact that one-half is built in Arkansas and the other half in Texas—but were late a few hours and had to take a premature supper instead. The famous Razorback

hog and the darkey were familiar objects in the landscape. In fact, they constituted the larger part of the population. From Texarkana southward the country began to assume a different aspect, becoming more rolling and sandy.

Our first destination was Tyler, Texas, at which place we were scheduled to arrive at supper but it was after 11:00 P. M. when we finally arrived. The delay was due to the soft road bed and to the fact that our engine left the track twice. We stayed at Tyler over night and were well cared for by a typical southern landlord with a broad expanse of white shirt bosom.

At Texarkana a number of real estate agents joined us and made life miserable for us the rest of the journey. The number of agents was increased at every stop we made, and each one endeavored to persuade us that southwestern Texas was the promised land and that we ought to own a section of land. I might say that in this attempt they were not successful as we saw no streams of milk and honey.

We left Tyler at 9:00 o'clock the following morning on our special train and arrived at Morrill, our destination, a station named after Mr. Morrill, the famous Michigan peach grower, who met us with conveyances. Mr. Morrill & Co. own 13,000 acres of land in and about Morrill and about 3,000 acres are now planted to peaches, over 2,000 acres will be in bearing the coming year. The great peach section extends from Tyler southward within 100 miles of the Gulf, the largest orchards occurring around Morrill, where a number of northern men have large plantations. A number of these plantations are now in bearing. The lay of the land at Morrill is very fine and the soil is a sandy loam, and an ideal peach and trucking soil. The wild land is generally covered with shrub oak, chestnut, pine and under brush. There can be no doubt but what the land is admirably adapted to peaches and truck in general. This has been amply demonstrated in the last few years.

The great advantage of this section for peaches and truck is that the crop comes on the market in advance of all other sections and hence brings a higher price. At the time of our arrival the melon and tomato season was over and sweet potatoes were planted on the land before occupied by these crops. The only apparent drawback to the development of this section is the lack of adequate transportation facilities and labor. I am inclined to believe that the number of very large orchards

planted will not be uniformly profitable and disastrous results to many orchardists are quite certain to follow. Trucking and orcharding on a moderate scale will undoubtedly prove very remunerative if not over done.

Before dinner we inspected the home orchard of Mr. Morrill and found the same to be in some excellent condition. A fine dinner was provided for by Mr. Morrill in which all partook. The afternoon was devoted to the inspection of a two thousand acre peach orchard about three miles from the station. In this orchard the peach trees were of the age of three and four years. They were very uniform and were well cared for. In fact it was said by those who have visited all the peach growing sections of America, that this peach orchard of Mr. Morrill's was the most perfect peach orchard in America. The land is almost level and composed of sand and loam. As stated it was located about three miles from the station and Mr. Morrill has spent several thousand dollars in building a turn pike out to the orchard. The turn pike may in the future be turned into a railroad track in order to facilitate ready transportation of his crop to the station. Mr. Morrill does everything on a large scale and is eminently successful in the management of his orchards and his men.

The labor problem is at the present not a very serious obstacle but is bound to be so with the rapid growth of the industry. Mr. Morrill has a contract with the state for sixty convict negroes who work every working day in the year at the price of \$1.00 per day, if I remember rightly; the state to care for the convicts and to supply guards and be responsible in general for their conduct. It was a pathetic sight well worth studying from a socialistic point of view to see sixty convicts lined up and planting sweet potatoes after the removal of the tomato crop. In front of the convicts were three guards with Winchester rifles and behind them the same number similarly equipped. On either side was a man with half a dozen blood hounds to prevent any negro from absenting himself. The foreman informed us that this type of labor was worth twice as much as ordinary white help obtained. These convicts will work incessantly for ten hours and the amount of work accomplished is astonishing to a northerner.

In speaking on this subject later to a citizen, the interesting fact was brought out that the question of convict labor in Texas

and other southern states was becoming a serious matter, the state making considerable money out of the convicts, since the cost of maintaining them never exceeded \$.50 per day, thus leaving \$.50 per day in clear profit to the state. While this may be economy for the state in caring for its convict population, it has another demoralizing side. It was intimated that the negroes in some sections were arrested and convicted for the smallest offense with little show to escape punishment and subsequent labor. The labor contracts are given to the higher bidder and there is a keen competition among the large planters to obtain all the help that they can from the prisons. In fact, the demand is greater than the supply and hence the remark of the person regarding the chances of the negro population in this section.

We were all greatly disappointed in not being able to partake of the luscious peaches which appeared to be very inviting on the tree. A mistake was undoubtedly made in not timing the excursion right.

In regard to the advantages of southwestern Texas for northern settlers much can be said, both on the side of Texas and against it. The white population are certainly desirous of having northern immigrants and undoubtedly would make the social life as pleasant as is possible under the existing conditions. There is no doubt but what there is a future for this section for people who intend to engage in early trucks with a small orchard of peaches, and from Mr. Morrill's statement I learned that he has been able to pay for all the improvements and expenses from trucks, such as tomatoes, sweet potatoes and musk melons. In fact, the field of trucking appeared to me more promising than the growing of peaches. I could not help but feel that the large peach growers in this section will suffer severely from lack of adequate transportation facilities, and also the cost of transportation and refrigeration from Texas to the north, which is very high. A statement was made that the cost of a car load of peaches from Morrill, Texas, to Chicago would be in the neighborhood of \$150 up to \$200 and \$225 to New York and Boston. This heavy charge will make a heavy inroad upon the net profit of the orchard. Mr. Morrill himself did not feel sure of the financial success of his venture though he hoped to be able to make a success of it. I feel at the present at least peach growing on a large scale in Texas is yet in the experimental stage and that in the next few years the question will be settled.

QUESTION BOX.

1. When and where was the State Horticultural Society organized? Give names of some of its members.

The Secretary: There is on file in the Secretary's office a copy of an old book, a report of which I think there are but few in existence, which states that the State Horticultural Society was organized in 1865. Now, there may be some here who will dispute that statement. The State Fruit Growers' Association was organized in 1853, which was really the beginning, I think it was at Whitewater a number of men met, among whom was George J. Kellogg and they held successful meetings and exhibitions for a number of years. Then at the beginning of the war the society lapsed and at the close, in 1865, when agriculture and horticulture began to attract more attention, they reorganized here at Madison, in the old Assembly Chamber, in 1865, and the society has been in existence since. In regard to the second part of this question I would refer the inquirer to our annual report, which contains the names of 350 annual members and about 35 life members. If the question meant charter members, that is a different question, that I cannot answer. I do not know that we have any other of the original members than George J. Kellogg living, I think he is the only living charter member of the State Horticultural Society. Mr. Kellogg is this winter on the Pacific coast.

2. Information wanted on the Red Cross Currant.

Mr. Street: I got it from Nebraska and have had it only about three years. I think it is one of the largest we have, a red currant of good size and bearing well.

The President: Is it one of the old ones named over?

Mr. Street: Well there are a good many of those that I am not familiar with. It is different from any I have.

Mr. Smith: Is it larger than the Prince Albert?

Mr. Street: A little larger than any on the market, I think. It stands up first rate.

Mr. Underwood: We have not tested the Red Cross Currant in Minnesota very much. I believe some of our Lake Minnetonka growers consider it a very good quality, but we have not had it long enough to be able to say it is the best currant. We think a great deal of the Prince Albert up our way. After trying some

of the newer currants, we have fallen back on that as the best market currant.

The President: Who originated the Red Cross, do you know?

Mr. Underwood: I do not know; the original stock that we got came from Ohio, from Dustin (?) I don't know whether he originated it or not, I do not believe so.

QUESTION BOX.

1. Three best varieties winter apples for southern Wisconsin. North slope with west protection.

Mr. Moyle: In southern Wisconsin under those circumstances if I would plant an orchard from three varieties, I would plant Fameuse, McMahan and Golden Russet.

2. What kind of soil is adapted for walnuts?

Mr. Coe: Rather low, rich, black soil.

AFTERNOON SESSION.

IOWA'S SHARE WITH SEEDLING APPLES.

MR. REEVES.

At the present time we are looking hopefully for the advent of not only one apple that shall be a valuable addition to our list, but for a list that shall include varieties of high quality for all seasons and all the various locations where apple growing has been so hazardous in the past. A few years ago we knew not where to turn for such a list and all parts of the earth were searched in hope of finding ready-made, the varieties we desired. We forgot for the time that other sections had produced their own varieties from seed and that even New York had her difficulties until her fruit growers by a liberal planting of seeds, originated their own list of apples suited to their conditions.

However, with them as with other eastern sections the climate was less severe than through the west and a hap-hazard planting sufficed to bring the desired results and no foundation principles were studied out to guide those who came later or those of regions where the difficulties were greater.

Having failed to find a ready-made list we have again turned to the production of seedlings and now begin to see the solution of the problem for us.

All through the northwest each neighborhood has its seedling varieties and every fruit exhibit brings out a number of more or less value. Many of these are small, of poor quality, poor growers or tender in tree or with some other fault that render them of little value.

But many people are interested in this matter and are planting seeds and looking for a prize to come forth.

Among fruit men the question is often asked, "what is your state doing in this work?" I can answer for Iowa that like other states each neighborhood has its seedling orchards and its favorites that are locally of great value and many are gaining a wider reputation. It would be impossible to name all that are claimed to be valuable and worth planting but among the best a few may be mentioned. Red Warrior, Prices Choice, Rankin, Ivin's No. 1 and No. 15, Ivin's Pipin, Stuart's Winter, Chisman, Adamson, Greggs, Hinkley, Clemons, Okoboji, Iowa Greening, Merritt, Banks, Winfrey, Ideal, Delicious, Old Dubuque, the Reigler collection among which are about fifteen valuable ones, one of which is a choice sweet apple, the Thompson seedlings long famous, and from Mr. Patten we have Patten's Greening, Arthur, Eastman, Brilliant, Summer Pear, University, Iowa Beauty and many others.

These named varieties are becoming well known and have decided merit. Old Dubuque is from a tree found growing near Dubuque by the early settlers and is a choice long keeper of medium size and should be well known. As to quality Delicious is the best ever grown. It is a Madison county seedling and in tree appears to be able to stand all through the state. Patten's Greening, a seedling of Oldenburg, is too well known to need description here. It is now one of the standards for home use and market. It is a choice cooking apple and sells at the highest price and the tree is as reliable as any we have from central Iowa far to the north.

On the college grounds at Ames are several thousand seedlings of various ages. Many of these are selected seedlings giving promise of value while a large portion are of known parentage, the result of work done by students and others under the supervision of the college and the Iowa State Horticultural Society and this line of work is being enlarged each year. Many people through the state are planting seed from known crosses or selected specimens and are on the alert for a valuable find. However, it is to C. G. Patten of Charles City that we must give credit for long continued and persistent work in the planting of seeds, making numerous crosses and studying the principles upon which this work depends. Not content with simply planting and waiting for results he has by long-continued study developed rules to aid in the selection of the parents for future crosses. He has on his grounds a large number that come from such varieties as Fameuse, Oldenburg, Grimes Golden, Johnathan, the Russets, Ben Davis, etc., and among his later seedlings his own Greening figures largely as a parent. If we had nothing outside of his grounds we should have no need of discouragement, but still he plans to continue and enlarge his work. In the field of producing new varieties he stands as the peer of the famous Burbank of California with this difference. Luther Burbank is working in a mild climate where nearly every plant produced is hardy and will do well in some portion of the field he covers. The question of hardiness does not enter into his calculations until it is time to decide where a new creation is to find a field of usefulness. In his mild climate it is comparatively easy to produce new fruits but a mild climate will not develop hardiness which is the main requirement in this cold prairie region.

Mr. Patten, located in the central portion of a greater prairie has a severe and changeable climate to contend with. A new variety may possess all the good points required except the ability to stand a rigorous climate and it is worthless to him.

How much greater patience has it required for Mr. Patten to study and work away for these thirty-five years with all the discouragements that nature has placed in his way and answer the remarks of men of lesser faith and works, keeping meantime a brave determination to solve the problem of producing a suitable fruit list and formulate rules to guide others in later years.

His Greening has already been mentioned. The Brilliant is

a pure Fameuse seedling and the best of the many I have seen. It shows the improvement in leaf that seedlings in this climate are inclined to and a vigor of tree as well, a seedling of Tetofsky and one from the Golden Russett as well as many others show the same improvement in leaf and general vigor.

Among his seedlings from Ben Davis is one crossed with Johnathan that is a treasure. The crosses with Grimes Golden are among the valuable ones and several of these with a Greening cross are long keepers, of good size and desirable quality and in tree appear to closely follow the Greening.

Many others might be mentioned but perhaps this is enough to indicate that Iowa is in the procession and trying to do her full share in this work.

QUESTION BOX.

(1) Which two varieties of plums are best to plant in Sauk County, on north slope, clay soil, to fertilize one another? Hardy varieties considered?

Mr. W. A. Toole: I think for a choice I would take Surprise and Quaker, although there are so many different varieties that it would be hard to name any two that would best.

(2) My young apple orchard on rolling clay soil raised a crop of wheat last year seeded with clover. Had I better plow it in the early spring, or hoe around the trees and plow in June and plant to corn, thus turning under a crop of clover, as the soil needs fertilizing?

Mr. Goodman: Do so by all means, plow under wheat and clover and then cultivate the trees well and put in corn. Corn is one of the best crops that can possibly be grown in an orchard.

Mr. Chappel: Corn or potatoes will do.

(3) Would you recommend Bordeaux mixture for summer leaf blight for the raspberry?

Mr. Rowe: It will take off your leaves.

Prof. Beach: I am not sure that I know what trouble the gentleman has in mind in speaking of the blight on the black raspberries. Raspberries I believe are sometimes affected with the pear blight, they more often have a leaf spot that makes

small spots in the leaves. I do not believe I would undertake to answer the question, because I am in the dark as to what the gentleman has reference to.

Mr. Swartz: My blackberries looked first rate until about picking time, then the leaves turned light and dropped off and sometimes that interferes with the crop. They turn yellow, they do not turn black. It is gravel soil.

Prof. Beach: Let me ask you, have you observed the canes, have you anthraenose or blight on the canes?

Mr. Swartz: We have anthraenose, but I do not think that is the cause.

Prof. Beach: In case of a general yellowing of the leaves as you have described, I should look for some root trouble or cane trouble that you cannot handle by spraying with Bordeaux mixture. I would advise you to send some specimens to your experiment station, and let them see what you have to contend with and they can advise you what to do with it.

Mr. Swartz: The canes seem to be strong, the roots seem to be strong and nice. The leaves drop right in the picking time.

Mr. Rowe: I think the trouble is with the roots. I do not think the trouble is with the canes.

(4) If a shy bearing variety of apple is grafted on a heavy bearing variety, will it have any effect on the bearing habit of the shy one?

Mr. Periam: The scion carries the blood of the fruit, the influence of the stock upon the graft is very slight. It is a question that is open yet, as far as I am informed, and probably always will be; it is a very deep physiological question.

Mr. Brackett: I think that in grafting, a tree that is a very strong grower and for that reason does not come into bearing so young, might be grafted onto a stock that would dwarf it somewhat and make it bear more readily.

The Secretary: This question relates wholly to bearing.

The President: Prof. Brown, can you give us some light on this question?

Prof. Brown: From my observation, and as far as we are able to learn from those who have studied the subject very thoroughly, there is no great influence in regard to shy bearing of fruit, of the stock upon the scion. There is supposed to be some influence on quality where a scion is grafted upon a stock of wild crab.

Mr. Moyle: I think we will have to admit that as a rule a shy bearing variety grafted upon a heavy bearing variety will affect the shy bearer and make it bear, simply for this reason: Let us reason back, what is the result, what is the growth of the tree, that as a rule, is a heavy bearer? We find as a matter of course that that is a slow grower, and it has that influence, if a shy bearer is grafted upon a heavy bearer, to check the growth, and as a consequence of that we will get fruit earlier on our shy bearing variety. That has been my experience.

Mr. Goodman: It will depend on whether the shy bearing of that variety was on account of its rapid growth, or whether it was on account of the lack of pollen, or upon lack of fertilization. That would be the point to be considered, whether or not it was due to the fact that the tree grew too rapidly. If it was just because of the growth of the tree, then if it were grown on a tree that would dwarf it or check it a little, that would cause it to fruit better, anything of that kind. If a tree does not bear, make it bear. There is no tree but what you can make bear, and bring them into bearing yourself, either by very heavy summer pruning, or by girdling and girdling is as good a way to treat an orchard if it does not bear as cultivation, or to improve in any other way, and we use girdling as part of our orchard work just as much as we do pruning, just as much as we do cultivating, so that if this variety is deficient in pollen, or not a self-fertilizer, why, that is one question, and if it is because of rapid growth, that you can overcome by grafting on a slower growing variety, or by girdling the tree.

Mr. Smith: One object of that question was to know if there is anybody here that has practiced that and knew whether it worked? I do not care especially in that about the theories, the why and wherefore, I want to know the facts, and what led to that question is this fact: We have growing side by side, about eight feet apart, a Grimes Golden and Duchess apple trees. The Duchess bears as the Duchess would do, and the Grimes Golden grows about, as far as I can make out, as they usually do, not any to speak of, and a few years ago I took a couple of slips of the Grimes Golden and stuck them into the Duchess, forgot all about them; a few years after I noticed they were full of apples, and the thought came to me, as that

Duchess made that Grimes Golden graft bear, whether there was an influence of any kind there that could be made use of.

Prof. Brown: I would like to enlarge upon that a little, and say that many times trees that are shy bearing in themselves, say, like the Baldwin, one that I am very familiar with, if planted in gardens composed entirely of Baldwins, they will not have very good crops, but if they are top-grafted with trees that are pollinizers, then they are good bearers. Now, this whole matter may not be a setting of a scion into a certain stock, but it may be a matter of cross-pollination; that is what it is in most cases.

Mr. Hatch: I want to arise to correct one mistake that is being made. It is taken for granted that the fast growing varieties are all shy bearers, which is not the fact. The McMahan's white is one of the strongest growers we have, and one of the heaviest bearers, and there are other varieties just the same.

The President: I want to say that perhaps in your putting that scion in there, you got a hardier scion than it would have been on the parent tree, and that perhaps the winters affected the parent tree so that it would not bear as much.

Mr. Periam: That is another phase of the question.

(5) What is the matter with strawberries that causes the leaf to commence rolling up soon after they commence blooming, and dry up before the berries ripen?

Mr. Richardson: I should say that that is the leaf roller, if I understand the disease right, something that is very prevalent is this state. It is not doing a great deal of damage at the present time, but that seems to me to be the symptoms of leaf roller. I know the leaf curls up tight, if you open it up you will find inside the leaf roller, which is a small green worm. That is one of the problems that I think them strawberry growers of Wisconsin will have to face at the present time, it seems to me the leaf roller is one of the most dangerous enemies we have got to fight in the strawberry business.

Mr. Crawford: I was at the Ohio Experiment Station last June to see their berries, and perhaps one-half of all the varieties they had were curled up in that way, not only curled up, but mouldy; they were in very bad shape. They do not seem to understand yet just what it is. What they had is not the leaf roller, we are acquainted with that, but it was a very serious matter. It is a new plantation on land that had been

used for vegetables, and the plants were in very bad shape, some varieties did not have one good sound leaf in them.

The President: What is your solution for that?

Mr. Crawford: Well, I have not any.

Mr. Periam: The natural solution would be that the garden ground was excessively rich in humus and that might produce a fungous disease.

Mr. Brackett: I have been in the strawberry business all my life and have had a great deal of experience in Iowa, South Dakota and in Minnesota, and more particularly in South Dakota, where we have our strawberries go into winter quarters dry, the ground is perfectly dry, and in such cases as that we have a great deal of root killing; while it may not kill the plant out entirely, it kills a majority of the roots; your crown may be alive and enough of the roots alive to start the plant into growth, it will throw out a few small leaves and sometimes the blossom bud will come open and the berries will form, it may be so, you will not get any blossom, and it may be so it will form a blossom and form fruit and may be you will get one picking off the vines, and your vines dry right out and your crop will dry out in short order. But if you will investigate that, nine times out of ten it is caused by the roots being injured by winter. I have seen acres of berries that have been hurt in that way, both in Dakota and Minnesota, and last winter that was the trouble with our strawberry crop in Minnesota; our crowns came out in the spring looking well and they started to grow, but in digging the plants we found a great many of the roots were injured, and when they came to fruiting we got one picking, and then the leaves shriveled up and dried up.

Further questions on strawberries were postponed, to be considered in connection with the other strawberry subjects on the program.

WEDNESDAY—MORNING SESSION.

REPORT OF DELEGATE FROM EUREKA LOCAL SOCIETY.

EVA LOOPE.

To the officers and members of the Wisconsin State Horticultural Society:

Rushford Horticultural and Improvement Society was organized on Feb. 19, 1893, and we have been very much alive all these thirteen years.

We now have a membership of about 65. We lost one faithful member by death, last May, one who was always in his place and who will be greatly missed as a charter member of the state society. I refer to Henry Floyd, one of the most enthusiastic and untiring workers our society possessed.

We hold our regular meetings on the first Saturday in every month and the kind leading members generally have a fine dinner for us.

You have all noticed, no doubt, how our state meeting is almost exclusively composed of men but in our local society the women are in the majority and keep up the interest by their untiring efforts.

Last June we had a strawberry festival and later we held a fruit and a flower show. Both were well attended, and much interest was manifested.

Luther Burbank of California was made a most interesting topic at a couple of our meetings. Our president for the year of 1906 has not yet been elected as we failed to hold any meeting this year—so the old officers hold over Dr. Loope, president and H. H. G. Bradt, secretary.

REPORT OF DELEGATE FROM OMRO HORTICULTURAL SOCIETY.

MRS. JAS. STEAD.

OMRO, WIS., Feb. 2, 1906.

The Omro Horticultural Society respect fully submits the following report for the past year.

Our society has held eleven meetings and our programs for the year have been both instructive and interesting. We have a membership of 70 besides a fair attendance of the young people who assist in the programs at different times.

At the Annual Meeting held January 12, the following officers were elected:

President—Henry Ross.

Vice President—A. Marshall.

Secretary—Mrs. Jas. Stead.

Treasurer—Mrs. W. J. Jenkins.

Delegate to Winter Meeting, Mrs. Jos. D. Treleven; Alternate Delegate to Winter Meeting, Mrs. A. B. Freese; Executive Board:—Chas. Oak, W. Ward, Mrs. Lester Stead and Mrs. A. Hyde.

REPORT OF ALGOMA SOCIETY.

L. J. ATHEARN.

To the Officers and Members of the Wisconsin State Horticultural Society:

The Algoma Horticultural Improvement Association has just closed the sixth year of its existance, a year marked by harmony and good works.

The society had at the close of the year an enrollment of about seventy-five members.

The officers for 1906 elected at the December meeting are: President, J. C. Davis, Vice President, Austin Payton, Secretary, S. J. Athearn, Treasurer Chas. Phillipson.

Following are the members of the executive committee who are appointed by the president and who with the officers form

the executive board: John Athearn, Mrs. Jessie Moon, Geo. Jones and Mrs. E. A. DuBoise.

The society meets regularly on the second Tuesday of each month. All the meetings are held at Grange hall which is located about two miles west of the city of Oshkosh.

This hall has many advantages as a place of meeting over a private residence that in the opinion of the members, amply repay the cost of rental which is \$2 per evening. It brings the members all together in one room facing the president's desk so that all may hear, see and pay attention to the program. There are sheds for the protection of teams during the meetings and the hall is provided with facilities for serving the basket lunches which are served at each meeting.

Besides the regular monthly meetings there is an annual public dinner which is given sometime in March. These events are always well attended and are made an occasion for recruiting our membership.

Our society learned with pleasure early last season that our invitation to the state society to hold its summer meeting in Oshkosh had been accepted. The various committees appointed to make arrangements for the summer meeting worked faithfully and harmoniously to make the summer meeting of August 29, 1905 a success.

The expense incurred in the entertainment of the state society placed our society slightly in debt, but a small assessment on the members followed by a successful box social enabled our society to meet all its obligations and have a small balance in the treasury at the end of the year.

The discussions in our society are not confined strictly to horticultural topics, as our membership contains patrons of all branches of agriculture. Informal exhibits of fruits, flowers and vegetables are made at the meetings in season.

The practical discussions—many of our members being successful horticulturalists—the social feature and the educative parliamentary practice are among the features that make our society popular in this community.

REPORT OF THE WAUPACA COUNTY HORTICULTURAL SOCIETY.

W. H. HOLMES.

The Waupaca County Horticultural Society has its headquarters at the county seat, Waupaca City, though we often hold our meetings at the homes of our members. There are no local societies at present in the county. The county society was formerly the Waupaca Horticultural Society and Improvement Association. We have about one hundred names on the rolls of the present organization. One meeting was held January 27th, 1905 at which time a splendid talk was given by A. J. Philips of West Salem on Wisconsin seedling apples in general and Waupaca county seedling apples in particular. Other interesting talks were given by Mr. Barnes of Arctic nursery fame, Dr. Frost of Chicago and Rev. F. A. Hayward of Waupaca and Mr. Holmes paid a tribute to the late O. G. Secor the originator of the Secor strawberry.

Another splendid meeting was held at Mr. S. S. Chandler's October 10, 1905, the day Prof. Sandsten dug across sections of the experimental potato field showing the results of sprayed and unsprayed potatoes. It is needless to say the results were in favor of spraying, a bulletin of which is or will soon be issued telling the exact readings and results. Apples were also exhibited from orchards sprayed and not sprayed showing that the orchard should not be neglected any more than the potato patch. The results in more dollars to the orchardist as well as to the potato raiser should be an incentive to spraying.

At our meetings the wants of the "inner man" are never overlooked as the good suppers prepared by the lady members always attest.

The following officers were elected at a meeting held January 27, 1906 at the Park Hotel in Waupaca City.

President, W. H. Holmes.

1st vice president, Mrs. Hollis Gibson, Lind.

2nd vice president, Mrs. A. D. Barnes, Waupaca.

Secretary, Ray Barnes, Waupaca.

Delegate to the state meeting, Madison, Feb. 6, 7, 8, Mrs. A. D. Barnes, Waupaca.

REPORT OF THE LAKE GENEVA GARDENER'S AND FOREMEN'S ASSOCIATION.

ALBERT H. REUPKE.

Mr. President, Ladies and Gentlemen: As the delegate from Lake Geneva, representing the Lake Geneva Gardener's and Foreman's Asssociation, it gives me great pleasure to submit my report, herewith. Lake Geneva is well known on account of its many fine and large estates and the homes of wealthy people surrounding the lake from one end to the other. The gardeners on these country places, seeing that much was to be gained through the exchange of experiences and new ideas organized themselves into an association on March 4, 1905 with the following object in view—to increase the interest in gardening, to make exhibits of flowers and vegetables at seasonable times and furnish each other with reliable information pertaining to gardening.

At our first meeting the association had thirty two members and has since increased to forty-five. We meet on the first and third Saturday of each month and although some of the members live from five to six miles away, many of them make it a point to attend these meetings which are nearly all made profitable and enjoyable to the members by showing flowers, fruits and vegetables and the reading of papers especially prepared for the association. It is one of our rules that everything for exhibition at our meetings must be correctly labeled. During the season were shown the first sweet peas on June 17, var., Earliest of All and Lady Spenser, also *Campanula persicifolia*, *Hauchera sanguinea*, Peonies and Cos lettuce. On August 19th, there were on exhibition some splendid spikes of *Gladiolus princeps*. On September 16 and 23 were shown fine collections of dahlias of all types and on October 7th the first chrysanthemums were shown grown out of doors, var., Glory of Pacific, Polly Rose, Mrs. Whilden, Omega and the Queen as well as a fine collection of grapes, and on January 6 some fine bunches of green house grown sweet peas. These had been sown October 15th and were therefore in bloom about seventy-five days later.

The following papers were read and discussed at our meetings:

The Propagation and Growing of Exh. Chrysanthemum pot plants by John Sligh.

The Culture and Propagation of Carnations by Alex. Johnson.

The Forcing of the following Vegetables: Potatoes, Cauliflower, Peas, Snap-Beans, Spinach, Beets, Head Lettuce, Onions, Radish and Carrots.

The Growing of Strawberries in frames, both papers prepared by A. J. Smith.

A paper on Wild Flowers by William Longland.

The Cultivation of the Grape-vine out-of-doors by James Balsden.

The Cultivation of Melons under Glass by Henry Tollman.

Hardy Perennials by J. Higgins, Lincoln Park, Chicago.

The Growing of Chrysanthemums out-of-doors by Frank Kuhns.

The Peony by A. J. Smith.

Then we have each month a paper on Seasonable Fruits prepared by some member. At the Mid-Summer Fair of which you have probably heard and with which we are affiliated, we made a display of flowers and vegetables which exceeded the expectation of every visitor. The following is an item from the L. G. News: "It is enough to say of the floral and vegetable exhibit that it was one of the finest ever held at any agricultural fair. The floral collections arranged for greatest effect were certainly in the highest state of art and attracted the attention and evoked the admiration of every one. Our congratulations to our Lake Geneva gardeners for this greatest of Fair hits."

In November on the 3rd and 4th we gave a flower or rather a Chrysanthemum show which proved financially as well as socially a great success. The premiums awarded were blue, red and white ribbons and some cash premiums offered by some of the shore residents. These premiums and the knowledge that all exhibits would be judged according to points by a competent judge made the competition keen and brought forth the best efforts of the gardeners and so added greatly to the success of our show. We closed the flower show with a banquet for the members and their visitors. At our next

meeting it was decided to make the chrysanthemum show an annual event in our association and we have already prepared the schedule list for this year. We have arranged to distribute chrysanthemum cuttings among the school children of Lake Geneva and will offer suitable premiums for the best plants grown by them by next fall. From the aforesaid you will perceive we are busy people, but still we found time to visit several nurseries and green houses. Last summer we made two trips around the lake with our families visiting the estates of our fellow gardeners.

At our organization the following officers were elected:

President, A. J. Smith, gardener for J. J. Mitchel.

Vice President, Alex. Johnson, gardener for R. F. Crane.

Secretary, John Tiplady, gardener for H. H. Porter.

Treasurer, Frank Kuehne, gardener for O. W. Potter.

Delegate to Windsor Meeting, Albert Reupke.

We are proud of our Treasurer's report, which shows:

In receipts from March 4, 1905 to September 1st ..	\$148 50
In expenses from same date	68 25
<hr/>	
Leaving a balance of	\$80 25

Then we gave our flower show on February 1st 1906 and our treasury shows an income of	\$561 75
and an expenditure of	327 92
<hr/>	
Balance	\$233 83

\$150 of this was put aside as a reserve fund to furnish the premiums at our next flower show.

Last June we had the pleasure of joining the State Horticultural Society and in the name of our association I wish to thank the society for the courtesies shown us and to extend to all an invitation to our Mid-Summer Fair and Chrysanthemum Show, as well as to any of our regular meetings if you should be in the neighborhood.

REPORT OF DELEGATE TO ILLINOIS.

W. A. TOOLE.

Your delegate to the Illinois State Horticultural Society was well entertained and reports a very enjoyable time.

This being the fiftieth anniversary of the organization of the society, considerable time was spent in reminiscence of pioneer days and reviews of the development of different lines of horticulture and related subjects during the past fifty years. None of the original members of the society are now living, though there were a number present who wore the "pioneer member" badge.

To a young man of the present day the enormous strides in horticultural progress during the fifty years considered was a surprise when so many illustrations were furnished together. The florist trade, the apple and small fruit industry, and market gardening have grown to very large size, and knowledge of the best means to combat insect pests and plant diseases, also methods of transporting and preserving fruit have developed from almost nothing during this time.

Besides the strictly historical papers, time was found to present much other valuable information. Probably the most notable thought brought out in the strawberry discussion, was, that to the commercial grower it is much more profitable to let the other fellow do the testing of new varieties. Owing to the fact that the strawberry plant will not grow well if planted so that the crown is too low or too high the transplanting machine does not find favor among Illinois strawberry men.

Bitter rot of the apple has received much careful investigation by the Illinois Experiment Station. This disease is not so troublesome in Wisconsin as it is south of us, yet at times it may become serious. The first infection of the fruit comes from cankered limbs and from mummified fruits left hanging on the trees over winter. Secondary infection may follow from the first infected fruit. Prevention consists in removing cankered limbs and mummified fruits and repeated sprayings with a fungicide. Much more careful spraying seems to be done in the commercial orchards in Illinois than the writer has

heard of in Wisconsin. Dust spray was pronounced a failure when a fungicide was used and of very little use in combatting the codling moth.

A very pleasing feature of the meetings was the strong spirit of mutual helpfulness shown by both the horticultural society and the experiment station.

While this was very much an apple growers' convention, ornamental horticulture and market gardening also received attention. Though there was some discussion as to varieties of apples, most of the time devoted to apple talk was spent on spraying.

The fruit display was large and very interesting, but few Wisconsin varieties were represented and the coloring and size of these were not equal to good Wisconsin specimens of the same varieties, such as are shown upon our tables. Their manner of arranging plates in the exhibits of fruit was very satisfactory. All competing plates of one variety were arranged together instead of grouping all the plates of one exhibitor. The re-arranging was done by a committee immediately after the entry books were closed. This method of arrangement would not be practical where sweepstakes are offered.

It was decided to judge fruit at future meetings by the use of a score card, the one recommended by the Massachusetts Board of Agriculture being adopted for present use.

The question box was a decided success at this meeting; it was put in charge of a competent man who distributed paper and collected the questions each day and who also lead in the discussions. A question box seems desirable where well handled, otherwise it is a flat failure.

A banquet was held which was well attended and it proved a very enjoyable occasion, presenting as it did, another side of the generally versatile horticulturist.

Your delegate was rather amused sometimes at the remarks of some of the citizens of Central and Southern Illinois who seemed to believe Wisconsin and the north pole have much the same climate and consequently that there is but little chance for fruit growing in this state.

REPORT OF DELEGATE TO IOWA.

WILLIAM HANCHETT.

It was with a feeling of unalloyed pleasure that I received Secretary Cranefield's notice that I had been honored with the appointment as delegate to the Des Moines meeting to be held December 12th to 14th 1905, for I must confess to a longing to explore new fields and discover whether or not the horticulturist there belonged to the same class as Wisconsin people. I arrived at Des Moines early on the morning of December 12th and took my way to the appointed headquarters as a gathering throng of earnest looking men gave notice that the crowd had commenced to arrive, and that horticulturists were the same earnest, energetic men the world over.

The time allotted the several sessions was well filled and the discussions interesting and spirited.

The directors from the several districts reported all classes of fruit vines and trees were in excellent condition through the state.

The discussion on spraying brought out the fact that where ever thorough work had been done that the results had been very beneficial, numerous instances being cited where thorough work during the past unfavorable season had been rewarded with a handsome return on an orchard while neglect had given no return whatever.

From the discussion on fire blight I discovered that they have just as many theories in Iowa regarding it as we have in Wisconsin, but would not be willing to concede that they have any more.

The general complaint of the small fruit grower was low prices and small profits.

One gentleman found it profitable to can his strawberries when the price dropped below \$1.25 per 24 qt. case; he used for this work an outfit that he made himself at a cost of \$50.00, with which he could can 1,000 to 1,500 quarts a day.

I was very much pleased at the practical businesslike turn all discussions took. The discussion on cold storage brought out the estimate that could the orchardists of Iowa by proper

cold storage facilities and by raising suitable varieties, supply the urban population with winter apples it would make a saving to the state of \$1,500,000.00 per annum and estimating that the rural population consumed as much per capita the saving would be over \$5,000,000.00 per annum.

Would not some carefully gathered statistics of this kind be of value to our state. There were over 600 plates of fruit on exhibitin at the meeting. The banquet given at the Savery Wednesday evening was a very enjoyable affair, and this report would not be complete without a mention of it.

REPORT OF DELEGATE TO N. E. IOWA.

CHAS. L. PEARSON.

The N. E. Iowa Horticultural Society held its annual meeting in Hampton December 19-20 and 21st; W. H. Guilford presided and John C. Ferris was secretary.

The delegates were warmly recived and hospitably entertained. The local attendance at this meeting was light. The total attendance averaging about thirty-five for each session.

The papers read were short and to the point, up to date methods of fruit culture were advocated and the discussions were spirited and keen.

Hampton is a beautiful little city of three thousand people and no saloons in sight. The surrounding country is dotted with groves of trees and the substantial farm buildings denote prosperity. Considerable fruit is grown near Hampton, 500 bushels of strawberries were marketed by N. E. Ferris last season. They were of the Jones variety originated by himself. We heard of one resident who sold \$900 worth of wealthy apples from 100 trees. Another local fruit enthusiast had recently ordered \$4,125 worth of plum trees, he was not present at the meeting. We hardly think it worth while for the nurserymen here to go to Iowa hunting for like chances to sell trees.

Hampton is proud of its green-house and the owner Mr. Ed. Curtis, who has by strenuous endeavor climbed the rugged

pathway of success—takes pleasure in showing visitors the blooming beauties which thrive beneath 10,500 square feet of glass. There were about one hundred plates of apples exhibited at the meeting some of the best being "Patten's Seedlings."

In his paper on "The evolution of the apple" C. G. Patten said that in the process of cross pollination he could control the color of the apple he wished to produce and could also control the form of the tree.

Prof. Beach told how the fruit grower could overcome some of his troubles by proper attention to spraying. He also gave an interesting demonstration on preparing the liquid Bordeaux mixture showing that each ingredient—the lime and the blue stone—should be dissolved and fully diluted before mixing together.

Elmer Reeves advocated the dust spray, claiming that it could be purchased ready for use, was easily applied and did the business.

In the discussion on trimming sec. Wesley Green of the state society said: "Don't trim your orchards severely, don't cut off large limbs, thin out the small limbs to let the sunlight in, and in a commercial orchard head the trees low."

C. Berthelsen, delegate from Minnesota, said he had cut off all the limbs in an orchard of Hibernal and grafted in Wealthy with satisfactory results. Mr. Berthelsen said the favorite varieties of apples in his locality are—Duchess, Lowland Raspberry, Wealthy, Patten's Greening and N. W. Greening.

Elmer Reeves gave the following as a list of fruit adapted to northern Iowa, Apples—Duchess, Wealthy, N. W. Greening, and Patten's Greening. He also spoke highly of Windsor Chief and Brilliant.

Plums—Desoto and Wyant.

Cherries—Early Richmond and Montmorency.

Currants—Victoria and White grape.

Gooseberries—Howland and Downing.

Grapes—Concord, Worden and Moore's Early.

Strawberries—Warfield, Dunlap and Crescent.

Raspberries—Turner, Cuthbert, Older and Kansas.

Blackberries—Snyder.

E. Blakeman of Decorah, Iowa said there were but few farms in his locality without apples, Wealthy and Patten's

Greening are favorites, pears are a failure, peaches no good, strawberries yield heavily and prices range low.

Prof. Van Houghton of southern Iowa talked on cold storage. Apples should be cooled over night before being placed in cold storage. The Wealthy is exceptionally good for keeping in this way. Cave cellars were recommended for storing fruit. They should be covered with three or four feet of earth and air admitted by an underground pipe and should have a small air chimney at the top.

The president's address recommended that papers be assigned six months previous to the date of next meeting. The members voted to adopt this rule.

These officers were elected for the next year. President, C. G. Patten; Vice President, C. F. Gardner; Secretary, C. H. True; Treasurer, E. Blakeman.

The next meeting will be held in Charles City.

REPORT OF DELEGATE TO MINNESOTA.

E. P. SANDSTEN.

Through the kindness of this society I was appointed a delegate to the meeting of the Minnesota State Horticultural society. The meeting on the whole was both profitable and interesting. It was held in the First Unitarian Church and the facilities for handling the crowd and the exhibit was very good, but so far as the general attendance was concerned it was a disappointment. It was told by the secretary that the membership of the society is nearly 2000, while the attendance was not larger than is here today. Many of the old pioneers were present as usual, prominent among them Mr. Wyman, Mr. Elliott, Mr. O'Brien, Mr. Yanhke, Mr. Latham, Mr. Loring, and our Mr. Phillips and Mr. Kellogg of Wisconsin.

The program was extended over three days and it was too full to permit of a full discussion of the various topics handled, and I think a mistake was made in trying to cover to much ground. One part of the program was given over to the nursery men and their customers. This part proved exceedingly interesting and brought out facts which the fruit growers in

general are not acquainted with, though the consensus of opinion was that the nurserymen and the fruit grower having the same object in view should be honest with one another. The promiscuous employment of agents was discussed as a menace to substantial progress. It seems that our society could profitably devote a half day to this subject in a future program.

The impression an outsider would gain from attending the Minnesota meeting would be that Minnesota horticulturists have gone apple mad, while Minnesota members may accuse us of going plum mad. Apple seedlings were the most absorbing topic and the exhibit showed evidence of great activity among fruit growers and farmers in the production of new seedlings. The exhibits were exceptionally large and fine, especially so was the collection of seedling apples. I think that the Minnesota people have stolen a march on us in having their meetings in December, as they can then make a better exhibit of fruit than we can in February. We can only exhibit fruit that has been kept in storage or a few of our winter apples. Whether any direct gain results from having the meeting in December instead of February is an open question but I think it worth while for us to consider.

There were two prominent apple seedlings exhibited. These two seedlings are now being propagated and distributed. There is also a seedling shown by Mr. Perkins of Goodhue County that stands very high and is now being extensively tested. This seedling is in line for the prize offered by the society for the best winter seedling.

The liberal prizes offered by the society for the production of apples and plums is beginning to bring results. Besides the prizes for apples there are two prizes for plums, one for \$1,000 and another for \$100.

Referring to the question of membership, I was impressed with the fact that while the membership in the Minnesota society is very large the attendance was relatively small and I firmly believe that the strength and usefulness of the society does not lie entirely in the number but in the enthusiasm and activity of the workers.

One criticism I would make on the meeting is the generality of the topics discussed and I heartily want to second our secretary's idea of the program, namely, that so far as possible

each paper presented at the meeting shall stand as a monogram or a thesis on that subject for a long time to come. It should, as far as possible, be a finished product printed for future reference. In this way only can permanent good be derived from the report and a history of horticulture in each state be recorded.

Another fact was brought back to me with greater force than ever, namely that while discussions in many instances are for the enlightenment of others, they are in other instances mere discussions of personal opinion which are hardly profitable since seldom two persons agree. Each speaker is insistent that he is right in his opinion—the fact is that we are all right according to our own opinion.

When we consider Minnesota's position on the map and her age as a settled state, I think that she has a right to be justly proud of her achievements. She will some day be able to teach her more favorite sister states the secret of profitable fruit growing.

The closing climax of the meeting was the banquet Thursday night, December 23rd. At this meeting a number of toasts were given, Mr. Phillips and Mr. Kellogg responding in their usual happy mood. Prof. Hansen of South Dakota gave a very interesting talk on Luther Burbank and his work. He dwelt at some length on the achievements of Mr. Burbank and upon the favorite soil and climatic conditions under which he is carrying on his labor. He was not able, however, to get from Mr. Burbank any direct pointers as to how he accomplished his marvelous results. Mr. Hansen's opinion was that Mr. Burbank's success was attributable to his intimate knowledge of plant individuals, his ability to judge the value of a seedling while in its infancy, and to the favorable soil and climatic conditions. The height of the discussion was engendered when the question was brought up of extending the list of the best apples for the state. The principal warriors were Professor Green and Mr. Wyman. On the whole, the meeting was one long to be remembered by those in attendance.

REPORT OF DELEGATE TO NORTHERN ILLINOIS.

MR. M. V. SPERRECK.

It was my good fortune to be appointed delegate to the Northern Illinois Society, which was held December 7 to 8 at Harvard, Illinois. The convention was held in the Opera House, with a good attendance and much interest manifested. The members seemed to feel that they wanted to gain more knowledge along the line of work that they are engaged in. The display of fruit was good; the apples, such as Jonathan, Wealthy, Pewaukee, Grimes Golden, Ben Davis and such varieties as that they had fine specimens of, and a nice showing of pears, I think about six varieties. Their exhibit of canned fruit was nice, and a very fine show of seed corn, which was not on the list for premiums, but they made a fine exhibit, the finest I ever saw. Their vegetable show was not very extensive, but they had good specimens.

Senator Dunlap gave them an able address on Successes and Failures of Fruit Growing. Mr. Schermerhorn, of Southern Illinois, gave them an able paper on spraying, showing the benefits, the profits and losses in the proper care of an orchard. He spoke of one man who had sold his crop on the trees for \$1,200, that orchard had been properly cared for, and, the man gathered the apples and took 2,600 barrels of apples from the trees, so they grow quite a few apples down there. Another man I think was a Chicago man who had bought a farm and had not cared for his orchard, perhaps thought spraying did not pay, or had not the time, and he got this gentleman to go with him and estimate for him what he should ask for his apples, he wanted to sell on the trees also, and he said when he got within sight of the orchard he could not see a leaf on the trees, that he concluded there was something wrong, and he went through the orchard, examined it thoroughly, and he said he could not find five apples on a tree that would sell for a number 2; I guess the insects were doing better work down there than they are in Wisconsin. And the old fellow was very anxious as to what he should ask for his orchard, and he finally said, "If you can get \$25 for your crop, you had better sell."

And the man who bought gathered the apples and he was out \$40 on the purchase price, so that it seems to me it demonstrated fully the value of spraying, and I believe to-day that the question of spraying is the leading question among fruit growers. Mrs. Hey, of the Society, had an able paper on "Home Adornment," and Mr. Rankin of the State University, gave them an able talk on the American Farm Boy. The only objection I could find was that he did not tell us how to make a smart boy out of a lazy one. The last evening was given over to the young people, and there was music and recitations and a very enjoyable evening was had. The Society re-elected President Thompson, who I believe is the right man in the right place. I believe that he is the lever that has raised Northern Illinois Society to its present standard, and I look back to this meeting as one of the bright spots along life's pathway. Now, I hope that our State Society will extend the right hand of fellowship to the visiting members and delegates from other states and accord them such a hearty welcome that they will feel that there are worse wild animals to meet than the Wisconsin Badger.

REPORT OF 1905 MEETING OF AMERICAN POMOLOGICAL SOCIETY.

S. H. MARSHALL.

Mr. President and Members of the State Horticultural Society:

The Twenty-ninth Biennial meeting of the American Pomological Society was held at the Coates House, Kansas City, Sept. 19, 20, 21, 1905. The meeting was opened the 19th at 8 P. M., and immediately adjourned to the dining room where the Society was served a most elaborate banquet tendered them by the citizens of Kansas City. The speeches were good and some of them very witty. Kansas City is growing and thriving very fast. The city is built on a hill of stone where houses can be built with the rock excavated from the cellar. They have a most extensive and up to date trolley system and we were given a chance to see it and the city by a ride all over

its lines one beautiful afternoon. Any one interested can refer to the pictures on the President's desk which have been left there for your inspection.

The Society opened for business the morning of Sept. 20th when the mayor made an address of welcome which was ably responded to by Mr. Parker Earle, upon behalf of the Society. Mr. Watrous, of Des Moines, Iowa, was elected chairman as President Hale did not come. After listening to the reports of the secretary and treasurer of the various committees, Prof. Albert Dickens, of Kansas Agricultural College, read a paper "American Plum in Kansas." As the climatic conditions in this state differ so from ours, there was little in this paper of value to north-western growers. In the discussion which followed Mr. Munson, of Texas, claimed that most of the Americanos winter killed with them. Mr. Watrous, of Iowa, found it impossible to dispose of his crop this past summer. He did not agree with Mr. Munson, but claimed that the trees referred to had summer killed, not winter killed. This paper was followed by several that were of no practical value to Horticulturists in Wisconsin. C. H. Williamson, of Illinois, chairman of the committee on Grading and Inspecting Fruits said that his committee were not ready to recommend any rules as yet, as it was very difficult to formulate a set that would be applicable to all parts of the country. Mr. Joe A. Burton, of Orleans, Ind., read a most interesting paper upon cultivation of Orchards as practiced by him in raising apples that won him a silver medal at Paris and a golden medal at St. Louis. From 117 trees of Grimes Golden that produced him half a crop of fruit the year before he sold \$1,750 worth of fruit this season. He does not believe in clean cultivation in rich land when there is liable to be any wash, but cultivates twice a year, fertilizes and uses quack grass for a cover crop. Sprays thoroughly with liquid spray and finds it cheaper and better to put two men at the pump handle. In the discussion of the paper by Mr. Pollards, of Nebraska (On Spraying) the consensus of opinion was in favor of liquid spray, though the dust spray had its advocates. The first spray before the buds start was the most important and that too much care could not be used in the preparation of Bordeaux mixture. There was considerable difference of opinion as to the best arsenic.

Mr. Coburn uses a preparation of 4 oz. white arsenic and 4 oz. sal soda, boiled 15 minutes and then add 4 lbs. lime. This quantity to each bbl. of water. Mr. Williamson who buys annually from five to ten thousand dollars worth thinks there is nothing so good as arsenite of lead. Parker Earle and others recommended Disparine very highly. It might be well to mention that the only enemy apple orchardists have to fight against as yet in the western states is the coddling moth.

Mr. W. D. Colburn, of Colorado, read a very interesting and novel paper on top grafting, using a saw instead of a chisel to make the cleft. He claims he does not loose one scion in a thousand and can graft a six inch branch as easily as a small twig. Saw a notch in the limb after sawing off the part above where you wish to insert your scion, use a half moon harness knife to smooth off the cleft. Cut the scions about two niches and after beveling it on one side hammer it into the cleft. Leave all branches below and do not cut them or the water sprouts away until the following year. Wrap plum or cherry trees to keep the bark from turning back. Wax the same as other grafts. This manner of grafting has been successful on 160 varieties of trees in the past ten years. The advantages claimed for it are that it is more successful, easier and faster than any other method.

Prof. Hansen, of South Dakota, then gave an interesting talk on Breeding Strawberries and Raspberries for the Northwest, but brought out no points that we are not familiar with.

Wednesday evening was devoted to short papers upon fruit growing, historically considered in some of the states west of the Missouri. While this was an entertaining session the conditions of that country are so different from ours they would be of no practical benefit to this Society.

We opened Thursday morning by electing Mr. L. A. Goodman, of Kansas City, President; Prof. L. V. Munson, of Texas, Vice President; John Craig, Secretary, and Prof. L. R. Taft, of Michigan, Treasurer. The balance of the morning was devoted to the benefits to fruit growers, and lessons learned at the St. Louis Fair.

The most interesting papers were given at the afternoon session by Mr. Bassett, of Michigan, and Dr. H. H. Whetzel, of Cornell, both of whom you will have the pleasure of hearing at our present meeting. The principal paper of the evening was

presented by C. L. Watrous, of Iowa, and was a very interesting talk on Japanese Horticulture as observed by Mr. Watrous and presented by him in his usual happy manner. This finished the program and we all felt fully repaid for our journey and with a renewed interest in the work we were trying to accomplish. It is not only the set talks that make these meetings so valuable but the meeting and discussing with the men in attendance. It is there you come in contact with the most prominent men in Horticulture from all over the United States. Who could help being benefited after spending two or three days with such men as Jno. Craig, of New York, Mr. Goodman, of Kansas City, Parker Earle and Prof. Fabian Gracia, of New Mexico, Prof. Beach, of Iowa, Col. Brackett, of Washington, Prof. Emerson, of Nebraska Agricultural College, Prof. Munson and Col. Kirkpatrick, of Texas, and C. L. Watrous and Mr. Patten, of Iowa, and dozens of others from thirty or more different states. I sincerely hope that at the next meeting that this Society will not send one delegate, but that they can afford to send four or six from various parts of the state. These men I speak of must be enthusiastic workers or they would not have arrived to the prominent positions in Horticulture that they now hold and you come away with a part of their enthusiasm.

The exhibit of fruit was fine and especially interesting was a display of Missouri, showing apples grown in 1903, 1904 and 1905, one of some thirty or forty plates of seedlings grown by our old friend Mr. Patten, of Iowa, and 123 varieties of peas grown on the grounds of Ellwanger and Barry. All of these exhibits were awarded Wilder medals.

On Thursday evening, September 21st, after procuring a berth in one of the two special Pullman's and a health certificate properly signed by the City Physician and Sanitary Superintendent stating that I had not been in the states of Mississippi or Louisiana I started on one of the most enjoyable excursions ever participated in by a body of Horticulturists. This excursion was tendered by the Kansas City & Southern and St. Louis and San Francisco Ry. Co.'s through the efforts of Mr. Goodman and his brother members of the Missouri State Horticultural Society, and others. From beginning to end it was most enjoyable and instructive and nothing was forgotten that would add to the comfort of any member of the party. Enough

cannot be said of the courtesy, thoughtfulness and efficiency of Mr. Goodman and his aids, and the railroad companies and their employes, the citizens of the various towns where we stopped or of the Horticulturists and farmers who lived near these various places. If we had been President and his Cabinet we could not have had better care nor greater ovations than we received along our line of travel. It took some time and trouble to get 73 of us provided with berths in the two Pullmans, but it was finally accomplished and we all retired in good spirits and full of expectations. We awoke next morning in the fruit country and had breakfast furnished us by the citizens of Neosho. After breakfast we were all given a drive out to the fish hatchery and hurried back to our train, which being a special did not leave until all were aboard. A short time after we had started Mr. Goodman (who was in our car) got up and said that we were now entering his orchard and would be going through it for the next ten miles. Here is food for thought for a man from Wisconsin with a ten-acre orchard on a sixty-acre farm. This orchard was only partially planted, some 2,500 acres mostly apples, but some peaches. The apples were not all Ben Davis, but of a number of varieties, Jonathan, Gano, Tompkins County, King, Grimes Golden, Pearmain, Wine Sap, Maidens Blush, Ingrain, Gravenstein and others. The soil is red and filled with stones (that is the best fruit soil) so that you could not use a disk on it. This soil seems in most places to be many feet deep. Cultivating an orchard here seems to mean plowing it up in the fall. Parts of Mr. Goodman's orchard was under cultivation and parts of it were grown to grass. There seems to be a wide difference as to the benefits of cultivation down here as there is with us. Many an argument was heard on the cars on this same subject, and I must admit that those against cultivation seem to have had the best of it, judging by the various orchards we saw through the Ozarks on our five day trip, and no good example of either a cultivated or uncultivated orchard was allowed to pass without the champions of that method calling the other side's attention to it. This is explained, I think, by their having such a very wet season there and the land most of it being very high and rolling. The sod land ran a great deal of the water off that the plowed land absorbed. Our next stop was at Gentry, where

we arrived about eleven. Here all the town turned out with a brass band to meet us. Twenty or thirty carriages, all the school children dressed in white to sing for us, and flags flying, everything in the true Southern hospitable style. We were driven through orchards and orchards and then brought back to town and had a dinner in the open square, and such a dinner. Fried chickens by the hundreds and such fried chicken, beaten biscuits, more than a dozen kinds of preserves, sweet and white potatoes in every style, beef, vegetables, pies, ice cream, cakes and a welcome, and you were forced to eat three meals in one because you could not help yourselves. This was repeated at all the other stops.

After our dinner we adjourned to the town hall and exchanged speeches for half an hour and then all aboard for Silvain Springs. We reached this pretty little city about five o'clock, and were driven to the springs and from there to the hotel to supper. About eight o'clock we gathered at the Opera House and had some more speeches, and a good audience. Two things surprised me here, and at several other towns we stopped at, the entire absence of negroes and saloons. A gentleman told me that some years ago when they had both, it took eight men armed with rifles and revolvers to keep order, and that now one man did the work, and they seldom had a prisoner in the lock up. We left Silvain Springs that night and breakfasted the next morning at seven at Horatio, the most southern stop on our trip. This place is about twenty miles from Texas and forty from Louisiana. After breakfast we were driven out to see a three thousand acre orchard all planted to the Alberta peach. This orchard is owned by a syndicate, and has been planted three years. The company cultivates on each side of the trees and the balance of the land, between the rows, is let out to farmers. They being given the use of the land, but must raise some crop that requires cultivation and in most cases cotton is the crop. This land stands the company about \$50 an acre with the trees ready to bear. Nearly all of it has been sold in small parcels at \$1.00 an acre. Under this arrangement the company has a very safe investment. From here we went north to McQueen where the train was held until we had dinner. We then continued on our way and had a most beautiful ride through the Ozarks. The country reminds one of Northern Wisconsin except that it is more hilly and the

timber is heavier. You see a small saw mill occasionally and the towns have a familiar look. The cities are well built, look new and thriving, with all the modern conveniences and you find wherever you stop northern people. The best of this timber land is worth from \$8 to \$10 an acre, and when cleared some of it makes good fruit land while that in the valleys will make fair farming land. In talking with a farmer from Jefferson County he told me his land would produce about the same as his old farm at home, and that he could increase his bank account quite a little each year on what he saved in fuel, clothes and feed for his stock. We arrived at Mena about supper time and some of us drove and others strolled about the city. This is a very pretty city of some 5,000 people, seven years old, surrounded by rough but charming country, and the air is clear and pure. No young man could make a mistake in starting here in almost any line of business. We had our usual speeches and then took our train again for Ft. Smith, where we arrived at 5:10 A. M. and spent the day, it being Sunday.

Ft. Smith is suite a place, being a city of some 30,000 inhabitants, with a very good hotel. We had no stated program for this day except a trolley ride in the afternoon out to a nice park of 100 acres or more, owned by the City Railway Company. They have a very nice club house at the Park, also owned by them, and they furnish free concerts and vaudeville shows for the general public. This is Southern enterprise. We spent the day (and it was a hot one) going to church, bathing and resting.

The party left Ft. Smith some time that night and arrived at Fayetteville in time for an early breakfast. After breakfast we spent several very pleasant hours going through the State University which is located here. We went from here to Rogers and then to Bentonville where we had another dinner and saw more orchards and had another pleasant drive and more speech making. From Bentonville we went back to Rogers, put in several hours there and then went on to Springfield, arriving there at night, and leaving shortly after. We got to Thayer at 6:10, and while waiting for breakfast the railroad people hauled us down to Mamoth Springs, a few miles below and across the state line. This is said to be the largest spring in the world and feeds quite a lake besides running two

good-sized mills. You can see the spring bubble up in the center of the lake and it will turn a boat over it is so strong. The few fish caught in this lake have no eyes and resemble the fish caught in Mamoth Cave, Kentucky. After a good breakfast at Thayer we went on to West Plains, stopping for a few moments at a large vineyard where we were shown a good display of apples and other fruit and given all the red and white wine we cared for. At West Plains we were given a long ride through the orchards, saw them packing apples in the best cared for orchard we saw on the trip. These apples were all sorted into three classes, the best were packed in bushel boxes, and the other two sizes into barrels. This orchard was sprayed with dry spray fertilized and the grass kept down by being mowed with a bar mower and the grass allowed to dry and rot on the land. It was a very clean and thrifty looking orchard. From West Plains we went to Mountain Grove, but made a stop on the way to see some small peach orchards, 40 to 20 acres each. The owners of these orchards had all made money, and the orchards looked as though they should make money for their respective owners. At Mountain Grove we drove out to the Missouri Horticultural Experiment Station. This is a large farm with fine buildings, devoted to the improvement of fruit and supported by the state. They are experimenting with new varieties, breeding new fruits, and trying different ways of culture, etc. We then drove back to town and participated in another of those delightful and long to be remembered out of door meals and speech making. This ended our trip and we left Mountain Grove that night and arrived in Kansas City the next morning.

Unfortunately they did not have a crop of either apples or peaches in the Ozarks this season, and we missed seeing the fruit in large quantities. As to the orchards, many of the smaller and some of the larger ones looked thrifty and well cared for. Again, a number of the big orchards and some of the smaller ones showed lack of care and the trees looked unhealthy. This was owing to the very wet and unfavorable season, and it is a question as to whether the big orchards are going to be successful or not. They may be divided up and sold in small pieces at an advanced price to the small farmer. That they will make big money for their owners, I have no

doubt. But it is my opinion it will be in the rise of the land, and not from the fruit they produce and market. We hear so much in our state against railway corporations that I would like to tell you how we were treated, and pay a slight tribute to the railroads who entertained us. They did everything in their power to make our trip successful; would stop the train whenever we asked it, sent with us a passenger agent and the head of their Horticultural Department. This department disseminated Horticultural knowledge to any prospective buyer. Have a sort of farmers' institute corps who preach up to date methods of farming along their line of road, and during the season act as agents to sell produce in Kansas City for their patrons, without charge. They seem anxious to help settle the country and take care of the people after it is settled, instead of wanting all the land themselves and robbing the public after they get them there as we are led to believe in these days.

I cannot close without again referring to the hospitality and interest the people of Kansas City, Missouri and Arkansas showed to the American Pomological Society. The ability and care shown by Mr. Goodman, Prof. Craig and others in conducting the trip, and the good fellowship, courtesy and consideration of the whole party during the entire trip, and to hope that you may all have the pleasure of seeing the Ozarks, the home of the Great Red Apple and the Alberta peach under as favorable auspices. Respectfully submitted.

PREMIUM LIST.

(Winter Meeting, Madison, Feb. 6-8, 1906.

1. Best Collection of Apples, not less than 10 and not more than 25 varieties (3d Prem. \$3.00)	\$10 00	\$5 00
2. Best 4 Varieties Winter Apples for market; quality, hardiness, productiveness and keep- ing qualities to be considered.....	3 00	2 00

3. Best 3 Varieties Winter Apples for family use; qualifications as above.....	2 00	1 00
5. Best New Apple named and in bearing at least 5 years, but not on society fruit list.....	5 00	2 50
Best Seedling Apple.....	3 00	2 00
Best Plate Ben Davis.....	1 00	.50
Best Plate Dominion.....	1 00	50
Best Plate Fameuse.....	1 00	50
Best Plate Golden Russett.....	1 00	50
Best Plate Longfield.....	1 00	50
Best Plate McMahan.....	1 00	50
Best Plate McIntosh.....	1 00	50
Best Plate Milwaukee.....	1 00	50
Best Plate Malinda.....	1 00	50
Best Plate Minkler.....	1 00	50
Best Plate Newell.....	1 00	50
Best Plate Northwestern Greening.....	2 00	1 00
Best Plate Perry Russett.....	1 00	.50
Best Plate Pewaukee.....	1 00	50
Best Plate Salome.....	1 00	50
Best Plate Scott Winter.....	1 00	50
Best Plate Tolman.....	1 00	50
Best Plate Utter.....	1 00	50
Best Plate Walbridge.....	1 00	50
Best Plate Wagner.....	1 00	50
Best Plate Wealthy.....	2 00	1 00
Best Plate Windsor.....	1 00	50
Best Plate Wolf River.....	1 00	50
Best Plate Seek-No-Further.....	1 00	50
Best Plate Twenty Ounce.....	1 00	50
Best Plate Willow Twig.....	1 00	50
Best Peck Northwestern Greening, Fruit awarded Premiums to become property of the Society	3 00	2 00
Best Peck Wealthy as above.....	3 00	2 00

LIST OF AWARDS—WINTER MEETING.

Collection of apples, not less than 10, and more than 25 varieties: First, A. N. Kelley; second, H. Simon; third, D. E. Bingham.

Best 4 varieties, winter apples for market, quality, hardness, productiveness and keeping qualities to be considered: First, A. N. Kelley; second, H. Simon.

Three varieties, winter apples for family use: First, H. Simon; second, A. N. Kelley.

New apple named and in bearing at least five years, but not on society fruit list: First, H. Simon; second, A. D. Brown.

Seedling—First, C. A. Hatch; second, A. N. Kelley.

Ben Davis—First, A. N. Kelley; second, H. Simon.

Fameuse—First, H. Simon; second, C. A. Hatch.

Golden Russett—First, C. A. Hatch; second, H. Simon.

Longfield—First, L. H. Palmer; second, A. D. Brown.

McMahan—First, D. E. Bingham; second, A. N. Kelley.

McIntosh—First, D. E. Bingham.

Malinda—First, A. N. Kelley.

Newell—First, C. A. Hatch; second, A. D. Brown.

N. W. Greening—First, Wm. Toole; second, A. N. Kelley.

Perry Russett—First, Wm. Toole; W. A. Toole.

Pewaukee—First, A. N. Kelley; D. E. Bingham.

Salome—First, H. Simon; second, Geo. J. Jeffrey.

Scott's Winter—First, O. J. Burnham; second, Wm. Toole.

Tolman Sweet—First, H. Simon; second, A. N. Kelley.

Walbridge—First, H. Simon; second, A. N. Kelley.

Wealthy—First, L. H. Palmer; second, Wm. Toole.

Windsor Chief—First, O. J. Burnham; second, D. E. Bingham.

Wolf River—First, L. H. Palmer; second, A. N. Kelley.

Seek-No-Further—First, W. A. Toole; second, Wm. Toole.

Willow Twig—First, H. Simon.

Peck N. W. Greening—First, A. N. Kelley; second, Wm. Toole.

Special premiums were awarded as follows:

Dr. T. E. Loope, display of Wealthy, \$2.00; W. E. Fitch, display of cranberries, \$1.00.

M. V. SPERBECK,

J. J. MENN,

Committee on Awards.

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TRANSACTIONS—WINTER MEETING.

ELECTION OF OFFICERS, (TUESDAY AFTERNOON).

The following were appointed by the president as a nominating committee to bring in nominees for members of the Executive Committee: Messrs. S. H. Marshall, F. K. Edwards and Joseph Treleven.

An informal ballot for the office of president was taken, which resulted as follows: Total number of votes, 43; Dr. Loope, 33; Mr. Toole, 4; Mr. Irving Smith, 2; Geo. J. Kellogg, 3; Mr. Edwards, 1.

On motion, the informal ballot was made formal, and Dr. Loope was declared unanimously elected.

Mr. S. H. Marshall placed in nomination Mr. R. J. Coe for Vice President, and on motion of Mr. Hanchett, the Secretary was instructed to cast the ballot for Mr. Coe.

The election of Treasurer being next in order, the Secretary was instructed to cast the ballot of the Society for the present incumbent, Mr. L. G. Kellogg.

A recess of five minutes was taken, after which the nominating committee submitted the following report:

MEMBERS OF EXECUTIVE COMMITTEE.

First district—Alex. Johnson, Lake Geneva (credentials).

Second district—S. H. Marshall, Madison (credentials).

Third district—Wm. Toole, Baraboo.

Fourth district—F. W. Harland, Milwaukee.

Fifth district—Henry Melcher, Oconomowoc.

Sixth district—L. A. Carpenter, Fond du Lac.

Seventh district—J. J. Menn, Norwalk.

Eighth district—W. P. Bussey, Omro.

Ninth district—Irving Smith, Green Bay.

Tenth district—R. B. Johns, Wausau.

Eleventh district—C. L. Richardson, Chippewa Falls.

After some discussion, the report of the nominating committee was adopted as read.

The president announced the appointment of the following committees:

TRIAL ORCHARD COMMITTEE.

R. J. Coe, term expires 1909.
D. E. Bingham, term expires, 1908.
W. J. Moyle, term expires 1907.

FINANCE COMMITTEE.

Irving Smith.
M. V. Sperbeck.
J. J. Menn.
Committee on Fruit Judging: Messrs. Sperbeck and Menn.
Committee on Final Resolutions: Messrs. William Toolc,
Moyle and Converse.

REPORT OF COMMITTEE ON FINAL RESOLUTIONS.

Resolved, That the thanks of the Wisconsin State Horticultural Society are extended to the Superintendent of Public Property and his assistants for courtesies extended to this Society.

Adopted.

Resolved, That the Secretary be instructed to confer with the Attorney General relative to securing the enactment of legislation designed to protect buyers of nursery stock and nurserymen from fraudulent practices of certain nursery firms and agents.

Adopted.

Resolved, That article III of the constitution be repealed and that the following be adopted as article III: Its members shall consist of annual members paying an annual fee of one dollar excepting that paid members of local societies may become members on payment of an annual fee of fifty cents, of life members paying a fee of five dollars. Wives of such members shall be entitled to the privileges of full membership: of honorary annual members who may by vote be invited to participate in the proceedings of the Society and honorary life members who shall be distinguished for merit in horticulture and kindred sciences or who shall confer any particular benefit to the Society.

Adopted.

Resolved, That we approve of and confirm the action of the Secretary of our Society during the past year in former practice of securing members from local societies on payment of an annual fee of fifty cents.

Adopted.

A resolution involving an amendment to Article V of the Constitution was by vote referred to the Executive Committee, action to be reported at Summer meeting.

FINANCIAL REPORT OF F. CRANEFIELD, SECRETARY.

RECEIPTS.

Membership fees	\$268 00
W. P. Ass'n, refund	11 00
D. E. Bingham, refund	3 50
W. A. Toole, refund	45
F. B. Drake, books	4 34
A. P. Wilkins, books	3 05
Order No. 276	300 00
Order No. 360	184 00
Order No. 372	200 00
Order No. 378	47 47
Order No. 448	31 04
Order No. 452	200 00
Received on 12 salary checks.....	1,200 00
Ed. Gensmann, fruit	12 18
Gilman and Rick, fruit	100 00
 Total	 \$2,565 03

CREDITS.

Credit by payments to L. G. Kellogg, treasurer.....	\$343 99
Credit by salary	1,200 00
Mar. 28. Credit by expense accounts allowed.....	82 80
June 3. Credit by expense accounts allowed.....	89 50
June 3. Credit by expense accounts allowed.....	311 69
Aug. 4. Credit by expense accounts allowed.....	47 47
Aug. 28. Credit by expense accounts allowed.....	51 07
Oct. 6. Credit by expense accounts allowed.....	231 04
Dec. 2. Credit by expense accounts allowed.....	52 83
Feb. 6. Credit by expense accounts allowed.....	63 10
Feb. 6. Paid to L. G. Kellogg, treasurer, to balance.....	91 54
 Total	 \$2,565 03

REPORT OF TREASURER.

Wisconsin State Horticultural Society, in account with L. G. Kellogg, treasurer:

RECEIPTS.

1905.

Feb. 10.	To cash from state treasurer	\$2,000 00
Feb. 15.	To cash, F. Cranefield, memberships...	67 50
Feb. 21.	To cash, F. Cranefield, memberships...	16 00
Feb. 21.	To cash, Western Passenger Ass'n	11 00
Apr. 11.	To cash, memberships	10 00
June, 7.	To cash, memberships	26 00
Aug. 5.	To cash, memberships	30 00
Aug. 5.	To cash, sale of fruit, Wausau orchard	12 18
July 10.	To cash, from state treasurer	4,000 00
Oct. 13.	To cash, sale of fruit, Wausau orchard	100 00
Oct. 13.	To cash, F. Cranefield, memberships...	36 00
Oct. 13.	To cash, W. A. Toole, refund express..	45
Mar. 14.	To cash, D. E. Bingham, refund	3 50
Mar. 14.	To cash, F. Cranefield, memberships...	5 00
Dec. 4.	To cash, F. Cranefield, memberships...	22 00
Dec. 4.	To cash, F. Cranefield, books sold	4 34

1906.

Feb. 6.	To cash, F. Cranefield, memberships...	50 00
Feb. 6.	To cash, F. Cranefield, cash returned..	45 56

————— \$6,439 53

DISBURSEMENTS.

By orders paid (Nos. 241 to 493, inc.)	\$6,012 17
Feb. 6. By balance due Society	427 36
	————— \$6,439 53
	—————

REPORT OF FINANCE COMMITTEE.

To the President and members of the State Horticultural Society: We are pleased to report that we have gone over the books of the Secretary and Treasurer of this Society and find all accounts in good form and correct. The last two vouchers Nos. 491 and 492 have not yet been returned.

IRVING C. SMITH,

R. J. ROE,

Finance Committee.

Miscellaneous Papers.

THE SUCCESSES AND DEFEATS OF HORTICULTURE.

DR. T. E. LOOPE, Eureka, Wis.

(Address at Annual Meeting of the Northern Illinois Horticultural Society, Princeton, Ill., Dec. 7th, 1904.)

This subject admits a wide field for speculation, as utter defeat to some natures would only serve as an incentive to greater effort to others, while a success to some might be deplored by others.

The terms defeat or success are but relative terms, varying according to the side lights turned on by different opinions or by those having different characteristics. The conceptions of Paradise differ in degree in the minds of the Indian, Chinaman, Esquimau, African or the good old shouting Methodist. The Mormon attains highest glory in heaven by the number of wives he possesses, the Indian by the number of scalp locks, the Chinaman by intercession of his Joss, the Methodist by faith and fervent prayer.

The Indian's God is pictured in his imagination as a great chief decorated with a head dress of feathers and plenty of wampum. The Chinaman's God a terrific image cross-legged on a pedestal. The Methodist God a resplendent figure seated on a golden throne in that city whose streets are paved with gold and where angels forever twang their harps in unison with songs of praise and adoration. The infidel's God—well, he is not quite sure he has one.

So it is according to the preconceived idea of individual organism that we judge, each for himself of conditions or facts.

The scientist tells you that grass grows by certain additions of cells and molecules, but the ordinary farmer says it grows

because it rains and the sun shines. None can answer the simple question of the child, who says:

What makes the grass grow, sister?
What makes the flowers bloom?
Who makes the golden sunbeam
To dance around the room?
Who made our God in Heaven,
And how did He get there?
Did He have wings like angels,
Or did He climb a stair?

The horticulturist is constantly asking questions as hard to answer as this child's. With patient, untiring persistence he is endeavoring to pry into Nature's secret workings. He carefully notes the effect of changing seasons on his crops. Fungous diseases are traced step by step and the proper remedies sought for. Insect enemies are studied and the best insecticides are made the subject of careful examination. The matter of hybridization is taken up and carried forward patiently for years, and yet after getting results many things remain unanswered.

If, after all his searching, he falters or grows weary of his quest, he suffers his greatest defeat. His material defeats come from lack of sun or rain; from surplus of moisture or withering sun; from ravages of insect pests; from lack of suitable tillage. His supreme defeat comes from lack of enthusiasm—the first, financial; the last, spiritual; without which he is like a mariner without a compass.

The horticulturist is one whose paternal ancestors were sun worshippers. His maternal ancestors may have been saved from the flood—one to whom the rain god was propitious. He is a distant relative of the man who served seven years for a wife, and failing of that maiden, grubbed along seven more for the sister. He was bound to be in the family. He is kin to Nebuchadnezzar—couldn't bear grass in his sight. He received the command in good faith, "By the sweat of thy brow," etc. He is the man referred to in the quotation, "By their fruits ye shall know them." He was one of the original gleaners, but they made a mistake and put skirts on him. He is no relation to those "Lilies of the field who toil not." He has no fellowship with that fellow who said, "A little more sleep," etc. A promi-

inent man in Wisconsin came near giving his status when he spoke of "God's patient poor"—but he said that for votes, and got them, too. If he broke into the legislature in Wisconsin he would introduce a bill for weed wardens in place of game wardens, only not so many and they would work cheaper.

His successes come through the enthusiasm he gives his work. A new variety of fruit is better than a bank account. A record breaking crop is a red letter event more precious than to be elected President. He figures his profits with a pencil and paper before his plants blossom. When the frost kills half the bloom he revises his former estimate and leaves a comfortable balance. The drought, blight or leaf roller cuts the last revision in two, and he still has a hope that somehow everything will be all right. The commission man takes the remainder, but still his spirit is undaunted with the prospect of a boomer next year. Therein lies the secret of his perennial cheerfulness. I don't know a horticulturist who wears a long face.

Neurasthenia is unknown in their ranks. His deportment may be quiet, but touch on his pet subject and his face lights up like an arc-light that throws no dark shadows. He never gets wrinkled like other men. He always has a new apple or berry that is the coming fruit, with coupons attached. His speckled apple has quality, hardiness and is a great cropper. His striped strawberry melts in your mouth and in size compares favorably with a football. A drouth improves the shipping quality of his berries. Excessive rains produce pedigree plants. I vouch for the truth of all these assertions, because I have heard him tell it. A cyclone is only a slight break in the thread of his anticipations. He is never a bad man, for he has no time. He may be illiterate, but he is not ignorant.

I have written of the horticulturist; of the man, rather than the subject. I know very little of horticulture, but a whole lot of the horticulturist. I have been associated with him in business and in pleasure. I have seen a great many of him in societies, and I know that he is the greatest enthusiast, the dreamiest dreamer, the most profound thinker, the greater master of detail in his line of business, the most careful investigator of Nature and her secrets, the entertaining talker, the biggest bore, the easiest to swallow bait, hook and line, the hardest to convince of error, the most modest, the one who is "Johnny on the spot" when he ought to "go way back and sit down," and the

nerve destroying high pitched droner who will talk all night about nothing to the destruction of sleep in the hotel he stops at. But as a whole, he is the salt of the earth.

He will tell you that a piece of zinc and copper hung in a tree will protect a tender tree from winter killing. That a little salt under a tree will make it prolific. That a layer of sand will do more than mulching or manure. That good stiff blue grass sod is the ideal condition for the orchard. That you should chop a tree to pieces to make it bear, and again that you should never prune a tree. He will talk at length about blasting holes to plant trees in. He believes in signs, but I never saw one who wore a rabbit's foot.

As a whole, he is a good, law-abiding citizen, a close observer, an honest, upright, capable man, inclined politically to prohibition, and a friendly, hospitable, all round good fellow. He labors and investigates for the good of his fellow man. He seems old while yet young and is youthful when the frosts of age have silvered his hair. He is indigenous to all ages and countries. He commenced his career in the Garden of Eden in the apple business. The millennium will find him at the climax of his glory, testing the latest seedling.

He will tell you that the common wild crab root is the best stock for grafting. That the Russian apple tree is the only successful tree. He will argue that the whole root is the whole thing, or that piece root will insure growth on its own roots. He will contend that the strawberry should be planted with a dibble, or that a machine must stab them into the ground. He is forever laboring to produce something more palatable and delicious, more useful and healthful than anything that has gone before. His field is the whole earth, his patrons the whole human family.

The defeats of horticulture may be multitudinous, but they are never paraded for the herd to comment on. No horticulturist ever tells of his luck when he tries to sandbag Nature. There is no glory in the tale. That man carries a purse with a black eye, instead of one filled with collaterals and greenbacks. His bank account has anemia. No man but a reformed drunkard temperance lecturer can tell the public what mean, low-lived things he has done. The average horticulturist is not financially a Rockefeller, but in integrity, intelligence and humanity he may rank higher than a standard oil magnate. Faith, hope and

charity are his peculiar virtues, but charity he reserves for his fellow man, and puts his faith and hope in active commission horticulturally. Many times his only assets are hope and faith. How poor is he who cannot reckon these in his yearly balance!

Like the "Specter that lifts the coffin lid of Hope and Joy and Love, and bending mournfully above the pale, sweet forms that slumber there, scatters dead flowers o'er what has passed to nothingness," the horticulturist leaves the defeats to their oblivion, and arising girds himself for the fray with a new hope that springs eternal and the faith that never fails, confident that success only waits for him that fainteth not in earnest endeavor.

Have you never thought of the grand benefits of your profession to mankind? Do you realize the importance of the results of your work to all the people of the earth? Did you ever try to estimate the magnitude of its beneficent influence? All the millions of humankind are eager for the products of your toil. The health and happiness of the world is involved in the success of your efforts.

Animated, then, by supreme hope and ardent faith, let us press forward and faint not, fail not, weary not, in our mission.

FROM MADISON DEMOCRAT, FEB. 9TH, 1906.

The work of the annual convention of the Wisconsin State Horticultural Society came to a close practically last evening with a banquet at Keeley's hall. More than 70 people partook of the sumptuous menu worthy of the yeomen of the soil who tickle mother earth until she yields bountifully of her best products for the benefit of all. Throughout the banquet and during the program Bach's mandolin and guitar orchestra added to the enjoyment and promoted the flow of soul after the feast. As toastmaster, Dr. T. E. Loope, president of the society, was particularly happy in his opening remarks as he introduced C. L. Richardson, U. W., '06, the only member of the society who appeared on the program. He had for his topic, The Creed of the Horticulturist, and extended a cordial welcome to the fruit growers from other states. He spoke of the benefits received by the members of the society who had attended the three

days' session. Grafting had been discovered in the society as well as in university athletics and the organization had perhaps become in one sense of the word "grafters." Many are the pleasures of the horticulturists as they fight the insects and plant diseases in the early hour of the morning. Unlike Diogenes of old he does not look for honest men but rather seeks the curculio and other destructive agents that rob the fruitgrower and deplete his pocketbook. The horticulturist has succeeded in making two spears of quack grass flourish where only one grew before. Plant growth has been retarded by the importation of the strawberry leaf roller and other foliage blemishes. Ever stirred up by the hope of a full crop despite the loss by frost, storm and insect ravages, the horticulturist struggles on, ever looking on the bright side, confident that some day, sometime, a good crop with high prices will crown his efforts. To lighten his labor he calls to his aid the latest discoveries of science, plants his apple trees with dynamite and utilizes all things possible in the warfare with stubborn nature.

From Michigan came George W. Rowe, a witty speaker, who was introduced by Toastmaster Loope as a man from that sandy country, who had the address of a dancing master, the air of a preacher and the nerve of a fruit tree agent. Mr. Rowe is a fruit grower on a large scale in the wolverine state near Grand Rapids. With anecdote and story aptly told, he was soon en rapport with his audience. The history of the origination of the seedless apple and its development into the tree which bore apples and sausage was particularly enjoyable.

The topic assigned Mr. Rowe, "Some Things I Have Seen and Others I Have Heard About," gave him ample latitude to illustrate the sham of the seedless apple which he laid bare in a way that convulsed the audience.

Praying or (s)praying is useless unless done in earnest, said S. A. Beach, professor of horticulture at the Iowa Agricultural college at Ames. He had for his topic, "Seeds," followed by the thought "Let us (s)pray." He brought with him the greetings of the hawkeye society and incidentally told of the merits of Iowa corn which had taller stalks, larger ears, more of them, and to cap the climax, each stalk was hollow from butt to tip and full of shelled corn. Professor Beach told of the corn gospel which is being preached thoroughly to the people of Iowa through the efforts of the agricultural college with its special

train traveling over the state. He is a thorough believer in pedigree corn which is to become the staple product of Iowa, thus enriching the tiller of the soil and through him the whole state. A notable feature of the census report, said Professor Beach, is the fact that the largest number of people who own the farms on which they live are the horticulturists, a condition very gratifying and satisfactory.

VOICE FROM ILLINOIS.

Pioneers in Horticulture was the subject discussed by Arthur Bryant, a retired fruit grower and a member of the Illinois Horticultural society. He sketched the origin of the society of which he is a member and traced its growth up to the present time, recounting also the growth of similar societies in adjacent states. In those early day he found a keen degree of earnestness in the work. At one meeting held in Princeton, Ill., two men from Wisconsin drove across the county to attend the session, the journey requiring from 10 to 12 days. The necessary funds for the work of the early societies was met by the members, who went down into their pockets for the hard earned cash, quite in contrast to the present day methods, which invoke the aid of the legislature. Mr. Bryant paid a high tribute to the earnestness and integrity of the pioneers who are rapidly passing off the stage of action.

PREACHER HORTICULTURIST.

"I believe there is a relation between horticulture and theology," said Dr. Updike, who announced that agriculture and horticulture were his avocation but his vocation was something else. He admitted that he obtained a keen degree of pleasure in caring for his hundreds of trees and shrubs, but was a trifle reticent about the amount of profit derived therefrom. Nothing develops men better than the life of a horticulturist or farmer and 'tis a blessing to a boy to have the privilege of living and working on the farm.

The life of a tiller of the soil develops originality, he who puts brain into his work does not need entertaining, as the inspiration comes to the man who is thus engaged, lending a charm to every day of existence. Dr. Updike claimed that boys would not leave the farm if the parents would make a

home in the best sense of the word, for in the country is the ideal spot for the true home to be made. He deplored the lack of taste displayed around the average farm residence and the apparent indifference and neglect manifested in the appearance of the grounds around the farm house. Here is where the work of the horticulturist comes in, and it has commercial value. It becomes the property of the public, affording enjoyment to all who pass by. There is as much real art in the proper arrangement of trees and shrubs as in the work of the artist. He pleaded for the establishment of a course of landscape architecture in the university, and felt that it was as great a nuisance to have architectural eyesores as those of an odorous nature. Dr. Updike's topic was The Use of Brains in Horticulture, and, as the toastmaster put it, "he practiced what he preached."

HISTORY OF HORTICULTURE.

A professed student of history has a keen interest in horticultural matters, said Dr. R. G. Thwaites, secretary of the State Historical society, who felt a degree of affiliation with the members of the society in their work. Dr. Thwaites claimed that at the age of 15 he had been led astray by reading that eloquent book, *Gardening for Profit*, this being followed by *Ten Acres Enough*. Dr. Thwaites and his brother then had an attack of chicken fever and succeeded in getting all the diseases known to the fowls in the coop. After three or four years' experience the young horticulturists were thoroughly disillusioned and convinced that the whole thing was a delusion and a snare. Dr. Thwaites was particularly happy in his illustrations of "things are not what they seem," the story of a Norwegian maiden being especially apt.

The extensive work being done by the horticulturists throughout the state led Dr. Thwaites to relate the strenuous work done in the Fox river valley whence come the delicious pears, while he was in search of precious manuscript for the society. He responded to the toast, *In the Days of Old*.

MADISON A CITY BEAUTIFUL.

"The success of a speech depends upon the sympathy of the crowd," said A. Brackett, a Minnesota horticulturist, and by

his application of the sentence brought down the house. He urged the planting of trees to beautify the homes and incidentally pair a tribute to Madison for general beauty and attractiveness. He responded to the toast Gophers and endorsed the oath of the Minnesota horticulturists, who swear that "we will support the Minnesota State Horticultural society, the Wealthy apple and the constitution of the United States."

L. A. Goodman of Kansas City, Missouri, was the next speaker. He is the most extensive fruit grower in the state having, it is said, over half a million apple trees, besides small fruits. Mr. Goodman is president of the American Pomological society and a man of great influence in fruit growing circles. He said we need poverty to force us to do things; it is an impelling power both in the state and nation. This is the day of microbes and the struggle with these enemies is what makes us grow, the more we fight them the greater is the resistance on their part, all of which makes for our good.

The last speaker was W. G. Moyle of Union Grove, who was introduced as the smartest, snappiest member of the society. He proved that his term was not a misnomer, as his remarks were permeated throughout with anecdote and story, the whole being in a happy vein.

A MEMORIAL ADDRESS.

A. G. TUTTLE, Baraboo, Wis.

BY FRANKLIN JOHNSON.

A. G. Tuttle was one of the charter members of the Wisconsin State Horticultural Society and one of its early presidents, succeeding in this office his beloved friend the late J. S. Stickney.

Mr. Tuttle was born December 30, 1814, in Watertown, Connecticut, hence was a native of that "Litchfield County" famed as the birthplace of Mrs. Harriet Beecher Stowe and other members of the illustrious Beecher family. At that time the very air was surcharged with the love of liberty and the

hatred of slavery. Mr. Tuttle, in the enthusiasm of his young manhood, became an ardent abolitionist. Before attaining his majority he made abolition speeches and under the direction of William Lloyd Garrison assisted in editing a little abolition paper. At the early age of nineteen he went to New York city to take charge of a large wholesale store, being recommended for the position by Seth Thomas, the renowned maker of clocks. After a year or two of strenuous but successful work in this store his failing health compelled him to return to his home in Connecticut. In 1838 he was married in Northfield, Conn., to Miss Elizabeth F. Clark. Their first home was in New Haven, where Mr. Tuttle had again engaged in mercantile business. In the autumn of 1846 he came to Wisconsin, stopping awhile in Madison, then going to Portage, where he conducted for Nat Dean of Madison the first store ever run in Portage. In the spring of 1848 he moved to Baraboo, where in the autumn he was joined by his wife and son whom he had left in Connecticut. For several years he was engaged in trade, but in 1854 he purchased the farm which was his home for more than fifty years. He at once commenced planting an orchard and became enthused with a love of fruit culture that continued unabated until his death. With a view to making Wisconsin a land of orchards, like New England, he began the sale of fruit trees in 1858, thus establishing the first nursery in this section.

When Abraham Lincoln was president and Cassius M. Clay was our minister to Russia Mr. Tuttle and his son procured cions of Russian apples with the hope of securing varieties that would withstand the severity of the Wisconsin climate. This was the first direct importation into the United States of Russian fruits. With these cions, they began the testing of Russian varieties. In 1866 he set out his famous Russian orchard which has attracted the notice of horticulturists throughout the country.

In the summer of 1904 his failing strength led him to leave his farm and go to the home of his son Herbert, in Water Mill, Wis. Here he was tenderly cared for until his death which occurred July 25, 1905, at the age of 90 years and 6 months. During the spring and summer he was able to be about the house and grounds until he was stricken with paralysis a week before his death. Up to that time he retained his intel-

lectual powers and his talent for repartee. The funeral was at the son's home in Water Mill, but he was buried in Baraboo by the side of his beloved wife who died in 1902, soon after the sixty-fourth anniversary of their marriage. They are survived by three sons, Herbert B., of Water Mill, Merritt I., of Fort Morgan, Col., and Edward K., of Mather.

Such, in brief, are some of the leading facts in Mr. Tuttle's life. Dates and data are cold and commonplace, but the Mr. Tuttle whom we knew and loved,—our Mr. Tuttle—was neither neither cold nor commonplace. He had a warm heart, an active brain, a quick eye and a ready hand. The various qualities that made the man were combined in such a way that they formed a striking personality. The vigorous intellect, the sterling integrity, the indomitable will, the tireless energy, these Corinthian pillars of his character, were reflected in the intellectual features, the frank expression, the broad shoulders and the firm tread which made him a noticeable figure in any assembly. I should like to speak at length upon these Corinthian pillars of his character, but time forbids. It also forbids more than a mere allusion to the acanthus leaves which twined so gracefully around them. These grew mainly from the kindness of his heart and from his keen sense of humor. As illustrative of his kindness you will pardon a personal reminiscence. On a winter day when the mercury was away below zero and the wind blowing a gale there came a rap at the door and in walked Mr. Tuttle, a vigorous old man though well past his four score years. As soon as he could get his breath he explained his visit by saying that he had heard I was not feeling well and so had come up to see if I needed any help about doing my chores!

His keen sense of humor led him to store his memory, with an inexhaustive supply of amusing anecdotes which he knew well how to tell, and it led him into the perpetration of numberless jokes. Mr. Tuttle's jokes were peculiar to himself. He would start off in a way that would completely disarm you of any suspicion of what was coming and then treat you to a kindly and good-natured "sell." To me the most amusing feature of the whole affair was his boyish chuckle as he noted your surprise at the unexpected turn he had given to the conversation. One day, when in his ninetieth year, he stopped at my house and said he had been over to see Mr. Miner's show



A. G. Tuttle in his ninetieth year. The vineyard of an acre in which Mr. Tuttle is standing was cared for that year by his own hands.

for a crop of plums. He added, "I find I can beat him this year." Of course I was surprised for Mr. Miner makes a specialty of plums. Mr. Tuttle continued very positively, "I can beat him this year, for I have got *one* plum and Mr. Miner hasn't any." Presently the conversation drifted to poultry. He said that for several years their chickens had been neglected and as a consequence hadn't done very well, but this year there were two hens that had succeeded in raising all the chickens they hatched. It soon developed that these two hens both set in the same nest and by their united efforts they had hatched *one* egg.

One more feature of Mr. Tuttle's career I must mention. "There's a divinity that shapes our ends, rough-hew them how we will." Mr. Tuttle's own plan for his life did not include a horticultural career. He fitted himself for a dry-goods merchant. Circumstances led him into horticulture. Advised by his physician to leave the store permanently, he essayed general farming but the chinch bugs destroyed his grain. Then he went to raising fruit. It afterward developed that he had unconsciously received a special training and equipment for the work he was destined to do. Did his experience in dry goods give him any special training for horticulture? I think so. Mr. Tuttle would handle fruit with the gentlest touch of any man I ever saw. I cannot help thinking that one secret of his success as an exhibitor was his sensitive touch. Yet if you looked at his hand it indicated firmness and strength. Whence came this supersensitive touch? It is a very unusual and remarkable thing in tillers of the soil. Was it not from the years of constant feeling of goods to judge of their texture? His wife, his sons, his farm, his location, his associations, yea, even failing health, chinch bugs, adverse seasons, panics,—all these conspired to make the noted horticulturist.

He never lost faith, he always, saw victory ahead. When honors came to him they rejoiced his heart and the hearts of his friends. He had earned them. Mr. Tuttle was a forceful writer and speaker. He was genial and hospitable. Probably no other home in the northwest has entertained so many noted horticulturists. The close of this long and active life was no "untimely end." He came "to his grave in a full age like as a shock of grain cometh in in its season."

TRIBUTES FROM OTHERS.

From Hayden K. Smith, Editor Chicago Chronicle.

"I held Mr. Tuttle in high regard as a man of strong character and of certain rare qualities which made him of great service to Wisconsin and the northwest in his chosen field of activity."

From Clarence Wedge, President of Minnesota Horticultural Society.

While I had considerable correspondence with Mr. Tuttle, my personal acquaintance with him was limited to one visit at his home, a visit which will ever remain a delightful spot in memory. Mr. Tuttle had invited me home with him from the Madison Horticultural meeting. At that time his wife was living, and I was entertained and looked after by the two, then living alone, each considerably over eighty years old. It has never been my lot to be entertained in a more cordial or graceful way, and I then thought them the most remarkable old people that I had ever met.

No sweetheart ever welcomed her lover with a more tender and graceful expression of affection than this delightful old lady her husband of sixty years, and the few hours of my acquaintance with her was a revelation of a beauty and loveliness peculiar to old age that I had never thought of. The grave does not, it simply can not, hold such a spirit.

I had arrived at night. The next morning Mr. Tuttle took me through his large orchard, wading through the deep snow, telling me the peculiar traits of each tree, talking of his future plans with all the vigor and enthusiasm of a man just entering the arena of life. Not a word of past failures or discouragements, or one doubt of the future. It was all a great cheer and uplift to me that can not be forgotten, and I am glad to acknowledge to my fellow horticulturists the great lessons taught me by those two wonderful old people.

From Prof. Samuel B. Green of the Minnesota Experiment Station.

Mr. A. G. Tuttle, late of Baraboo, always impressed me as a man of keen judgment, who meant to be perfectly just in what he did, and feared nothing. As a horticulturist he was progressive, energetic, far sighted and reliable. I felt when he died that I had lost a dear personal friend.

I would be very glad to add more to this memorial, but take it that you would not have space for more than this.

I think I shall plan to have a photograph of Mr. Tuttle for my gallery of eminent northwestern horticulturists, to hang in my class room.

From A. J. Philips, a Charter Member of the Wisconsin State Horticultural Society.

I always held Mr. Tuttle and his good, faithful wife in the highest esteem. I visited them many times and always admired his pluck and energy. He was ready to add a helping hand to anything he conscientiously thought right, and just as ready to pronounce his disapproval of anything he thought was wrong or misleading. You always knew where to find A. G. Tuttle when you asked his opinion. He was vice-president from Sauk county at the organization of the State Horticultural Society at Janesville in 1856 and was a hardworking, worthy member during all the years since. He personally exhibited apples after he was eighty years of age.

IN MEMORY OF MY FRIEND, A. G. TUTTLE.

Geo. J. Kellogg, Charter Member of the State Horticultural Society.

In reviewing my horticultural work in Wisconsin since 1852 very few men have stood higher in my estimation than A. G. Tuttle. He was most active and enthusiastic in introducing the Russian apples, in correcting their nomenclature, in selecting and in proving their adaptation. No one ever took more pride in showing the finest exhibits of the Russian and American apples. Mr. Tuttle was ever to the front in Wisconsin horticulture and his place can never be filled.

HENRY FLOYD.

Dr. Loope: It seems to devolve upon me to say something of our Mr. Henry Floyd, who died last spring, and I cannot give you the date; unfortunately his family were not in the state, or where I could see them, they were at Eureka Springs, and the daughter wrote me that she thought perhaps I could say a few words about her father here.

The end with Mr. Floyd came very suddenly on a Sunday afternoon. He was reading the newspaper to his wife and he had been reading some time when he seemed to hesitate and she said, "Why don't you go on?" and the paper fell, and the mentality of Mr. Floyd was gone. I was there within two minutes and knew that the end was near and there was no consciousness left. He lived very close to me. I have known Mr. Floyd for more than thirty-five years. He was a strong man physically and mentally. He was an energetic man, he was unceasing in whatever he laid his hand to. He also retained his mental powers in quite a good degree up to the time of his death. For a year or two he had some premonition of this same end, at least so it seemed. He had sudden attacks of dizziness and the winter before he spent in Eureka Springs with his son and was attacked there, so that they were quite sure that something was coming to him and spoke to me about it, still he went about as usual up to the time of his death.

He very early engaged in horticulture. He planted an orchard in the town of Aurora, near Eureka many years ago; I think in the fifties, and had a successful orchard there for a good many years. However, he planted the old varieties that succeeded in the East and they could not succeed in his location for any great length of time. Still, in 1885 he had a great many apples there. He also was engaged in raising some fruit stock; he always was grafting some apples or some plums or pears, and he always had a plot of them, even up to the time of his death, and after he left his farm life and came into the village, I have seen him drive out a great many times about three miles to a little plat of ground where he had been grafting plums and pears and apples and things of that kind. He took a great deal of pride in the plat and of late years he never sold them, he let rabbits eat them up, and of course gave some away.

He was a man, as I said, of strong mentality, a strong character, somewhat intolerant in his opinions, he generally thought with a great deal of care, he may not have been always right, but he was always very sure that he was nearly right, and that was a characteristic of the man. He was always present at the local horticultural society, and I think attended the State Horticultural Society very closely for a good many years, not always of late years. Many of you know him and have known him for years, and you have your estimate of his character as well as I. He was a thorough horticulturist always, it was his pride and his hobby and he continued in business as long as he lived.

SPRING FLOWERING BULBS.*

F. Cranefield.

The spring-flowering bulbs are a joy and a blessing. Flower beds and borders that would otherwise be bare and unsightly in the spring may, if filled with tulips, be a blaze of color for weeks. Those with crocus, narcissus and others of the Holland bulbs, will give an abundance of bloom before the annuals and the summer flowering plants may be safely planted. In order to have this it is necessary to plant in the fall. October is the month for preparation for this brilliant spring show. But the planting may be done any time before the ground freezes.

Crocus, tulips and similar bulbs are grown in Holland and are sent to us in late summer or early autumn and may then be had from florists or seedmen dry and dormant. The bulbs have in their thickened leaves a storehouse of food surrounding the perfectly formed embryo blossoms. We need only to plant them in rich well drained soil any time before the ground is frozen and cover with a mulch of heavy leaves. However, in order to meet with full success we must observe certain practical considerations.

PREPARATION OF SOIL.

The beds where summer flowers have been growing should now be cleared of rubbish, the soil deeply spaded and well pulverized. Deep tillage is essential, as the roots of bulbous plants strike straight downward, branching but little.

DRAINAGE.

The soil must be light in texture and well-drained, as the bulbs will decay if water settles about them. If the soil is a heavy clay it will be well to raise the beds a few inches to insure perfect drainage.

MANURE.

It is not essential that the soil should be very rich. It is more important that it be light and porous. Use only thoroughly decayed manure. Fresh manure will cause the bulbs to decay.

PLANTING.

Tulips, etc., are usually planted in "designs" or masses of contrasting colors. As the bulbs of the different varieties are all much alike in appearance great care is necessary in handling to avoid mixing. After the beds are prepared for planting and the design outlined the bulbs may all be set on the surface of the bed, placing all of one kind before commencing with another.

Make the holes for planting with the fingers. Cover lightly and after planting compact firmly the whole surface of the bed by walking over it. Do not push the bulbs into the soil without first making holes, for this leaves them on a bed of hard soil and the straight downward growing roots will tend to push the bulbs to the surface.

WINTER PROTECTION.

The bulbs here recommended for planting are all hardy in the sense of power to withstand cold, but all require a winter mulch to prevent alternate freezing and thawing. This is best put on after the ground is frozen and may consist of 3 to 6 inches of leaves or strawy manure. Field mice are very fond of bulbs and are apt to harbor in the mulching if it is put on before heavy frosts.

SPRING TREATMENT.

Uncover early in the spring as soon as their first leaf buds appear. Do not fear late spring frosts, as tulips, etc., suffer but little or not at all from freezing if the growth is made in the open. There is greater danger of injury by frost to the spindly growth resulting from delayed removal of the mulch.

SUMMER TREATMENT.

After flowering the tops turn yellow and die and the bulbs may be allowed to remain in the ground for a second and even a third year. Annuals and bedding plants may be planted without disturbing the bulbs. In case it is desired to remove them immediately after flowering dig carefully and "heel-in" or transplant closely in rows in the garden and leave until the tops die; then lift the bulbs, dry a day or two in the sun and store in a dry place until fall.

KINDS TO PLANT.

Tulips.

There are several classes (trade lists) of tulips, but the single early sorts are most satisfactory for outdoor culture. The following kinds are of like period of flowering and of the same height, two important features in large beds:

Red—Crimson King, Artus, Belle Alliance.

Yellow—Chrysola, Yellow Prince.

White—Pottebakker, Cottage Maid, La Reine.

Variegated—Keiserskroon.

The Duc Van Thol class is somewhat earlier than the above, but with smaller flowers. These may be had in scarlet, rose, yellow, white and crimson.

The Parrot tulips have curiously shaped blossoms with fringed petals. These are odd but not adapted to massing.

The Darwin, Byblous and Bizarres are single late kinds, growing 2 to 3 feet in height. More prized for cut flowers than for bedding. Very late and cannot be used where the beds are wanted for summer flowers.

All so far named are single. Double flowered sorts may be had in all the shades of red as well as yellow, white and variegated.

Plant tulip bulbs 3 to 5 inches deep (bottom of the bulb) and 4 to 6 inches apart.

Narcissus.

Of the different classes of narcissus the daffodil or trumpet narcissus is most satisfactory for out-door planting. The Trumpet Major, single, and Von Sion, double, are two satisfactory kinds; both rich golden yellow.

The Pheasant's Eye, white with yellow center, is also hardy. The Polyanth class, of which Paper White is a representative, is not hardy out-doors in Wisconsin.

Hyacinths.

Hyacinths are much admired on account of their delicate colors and delightful fragrance. The single sorts are to be preferred for bedding, as the flower spikes are the more graceful and not as likely to droop as the heavier double ones. Various shades of blue, red and yellow may be selected from the lists of dealers. The following are good: Robert Steiger, Grand Vainquer, Voltaire, Chas. Dickens and Czar Peter.

Hyacinths will not thrive in wet, heavy soil. Light, sandy loam is best. The bed should be spaded to a depth of 18 inches or more and thoroughly pulverized.

Plant 6 inches deep and 6 to 8 inches apart.

Crocus.

The crocus is the earliest of the spring flowering bulbs to blossom and if planted in borders or grass plots may remain for years undisturbed.

Plant 2 to 3 inches deep. The plants require but little room and may be set 2 to 3 inches apart if desired.

The kinds here mentioned are the ones commonly planted in beds and borders. A few others, as the Snowdrop, Scilla, etc., may be added if one desires a collection.

PLANT A FEW.

of each and brighten the home in the early spring. But little room is required and the culture is simple.

CHILDREN

love flowers. Let them make a tiny bulb garden. They may plant with their own hands, cover them for their long winter sleep and watch day by day in the spring the opening buds. This will be "Nature Study" at its best.

TEACHERS

often plan and plant flower gardens on the school grounds only to leave them at the beginning of their beauty as school closes. A bulb garden will be at its best at the time when we wish to draw the attention of the children to things "out-of-doors."

POT CULTURE OR FORCING.

Many bulbs may be easily grown indoors and furnish a succession of bloom from Christmas until spring. Tulips do not

force readily but all of the narcissus family, including the Chinese or sacred "lily," the miniature hyacinths and many others are easily grown.

SOIL.

A rich garden soil mixed with leaf mold and sand should be used. Do not use heavy clay soil nor fresh manure. Unless thoroughly decayed fine manure can be had it is better to use none at all. The compost should be well mixed and sifted before using.

POTTING.

Four and five-inch pots are commonly used. Fill these half full of soil, place the bulbs on this, one hyacinth or 3 to 4 tulips in a 4-inch pot, and fill to one-half inch of the top. Water thoroughly, place in a dark corner of the cellar and cover with earth or sand. This is for the purpose of developing root growth in advance of leaves. If left in the light the leaves would develop before roots were formed and exhaust the bulb, leaving no energy for flower development. If the soil is kept moist by frequent sprinkling, in 5 or 6 weeks the pots will be well filled with roots. A few may now be brought to the light and the remainder retarded by removing to a cooler place.

Light wooden boxes 4 to 5 inches deep may be used in place of pots.

WATER CULTURE.

Hyacinths may be grown in water. Glasses for this purpose may be had at florists. Large-necked bottles will answer as well. Fill with water and place the bulb with the base resting on the water; place in a warm, dark closet, keep the bottle filled with pure water and when the roots are 3 to 4 inches in length bring to the light.

The Chinese lily or narcissus may be grown wholly in the light. The large forked or branched bulbs may be placed in water in a shallow dish in the window with a few small stones to support the roots. No further care is necessary beyond renewing the water supply as exhausted.

SPRAYING.*

F. Cranefield.

The successful culture of fruit demands a knowledge of tillage, fertilizing, pruning and the methods of combating insects and diseases.

It is mainly the lack or acquirement of knowledge concerning the enemies of the crop that distinguishes the successful from the unsuccessful fruit-grower.

Animal husbandry demands skill in feeding and the general care of animals, but diseases as a rule are left to the veterinarian, but when our fruit trees are affected we must be our own doctor.

Trees may be totally neglected after planting and eventually give some sort of returns, but such practice is not worth while. If fruit trees and plants cannot be properly tended none should be planted, for the results will be disappointing.

Two classes of enemies attack fruit trees and plants, viz.: insects and fungous diseases; the application of substances, usually liquid, to the tree or plant for the purpose of preventing or destroying these constitutes spraying.

We spray to destroy insects and to prevent fungous diseases. Spraying is no longer an experiment. It is an established fact that intelligent and persistent spraying always pays.

The effects of spraying are cumulative. The effects of spraying last year and this year may result in an increased yield next year.

Spraying is not an exact science; we may and indeed should modify methods and formulas to suit conditions. The beginner need not fear that his trees will be ruined by lack of knowledge relating to the full and exact methods of preparing formulas for only by gross carelessness or utter disregard of simple directions could such results occur.

Certain points, however, should always be observed. Three of these are so clearly stated by Lodeman[†] that they are given here verbatim.

"First, be on time. Make an application when it will do the most good, and never allow that time to pass if it can possibly be avoided. Every delay is of advantage to the parasite, and it will be used so well that in most cases the injury cannot be re-

*Reprint of Bulletin No. 4, Wisconsin State Horticultural Society.
†The Spraying of Plants. Lodeman. P. 226. Published by the Macmillan Co.,
66 Fifth Ave., N. Y. Copyrighted.

paired. The destruction of one insect may mean the destruction of hundreds, and one application made at the right time may mean, and generally does mean, the protection of a plant against millions of spores of fungi which are endeavoring to gain a foothold. Be ready for action at a moment's notice, and when that moment comes, spray!

"Second, be thorough. When spraying a plant, spray it well, With a little care, a complete success may be obtained instead of only a partial one. When the work is finished, the grower should have the feeling that it is well done, and then no fear as to the result need be entertained. Spraying is not always pleasant work, and the temptation to slight it is often strong; but the operator will be rewarded just to the extent to which he has been painstaking, and to that extent only.

"Third, apply sprays intelligently. This is really the most important factor of the work, although good crops can be obtained without it, provided directions are followed. The first two points cannot be neglected without injury to the crops, but this one can be. The crop is in need of the applications only, but the grower should know the reasons for them, and should conform with the character of the insect or the disease which is being treated, and with the season. Every year and every day such knowledge will be of value. So many things are still unknown, and so many points still in dispute, that personal knowledge and judgment about individual cases are not only desirable, but very essential. Directions covering the majority of cases can be given, but now and then one will come up which seems to differ from all others, and it is then that this knowledge will prove most valuable.

In order to derive the best results from spraying we need a knowledge of the life history of the insects and diseases commonly affecting our plants.

In a publication of this nature it is manifestly impossible to enter into a wide discussion of these subjects. Several excellent books have been published which present the subject in full. A perusal of one or more of these supplemented by close observation will be helpful.

An acquaintance with certain elementary facts, however, is essential to any intelligent work in spraying.

THE TRANSFORMATION OF AN INSECT.*

"To fight an insect intelligently one must know its life history. There are certain periods in its life when it is vulnerable

*Prepared, by request, by C. F. Bues, State Nursery Inspector.

and others when it is protected. This change of conditions is largely due to the fact that most insects in the course of their lives undergo a great many changes of form; they undergo a "*transformation*." Mostly the various stages of this transformation look so different that if we did not know, we would set them down as different animals. Thus we have insects with a *complete "metamorphosis,"* which comprises four stages, and those with an incomplete metamorphosis with less stages. The stages of one of the higher insects with a complete metamorphosis being known, we can infer the corresponding stages of most of the lower forms.

As an illustration the four stages of one of the most destructive, and yet by most people little known insects, the *codling-moth*, which in one stage is the "apple worm" are here placed in the form of a life cycle.

I. *The egg* is laid on the apple.

II. From the egg hatches the *catterpillar* or apple worm, which eats its way through the blossom end into the apple. *This is the only stage in which an insect grows.*

III. The caterpillar has changed to a *pupa*, a resting stage, under the bark of the tree.

IV. Out of the pupa emerges the *moth*, the *adult* insect. In this stage reproduction takes place and we begin our cycle over again with the egg.

To these insects which go through these four stages belong the butterflies, beetles, bees and flies. Some insects lack the resting or pupa stage, and the young, when hatched, resemble the adult to some extent. These are insects with an *incomplete "metamorphosis."*

The insects affecting fruit may be divided for convenience into two classes, which are distinguished by their mode of feeding, viz., eating or chewing insects and sucking insects.

Eating insects consume the affected tissues, commonly the leaves, and thereby hinder the functions of the plant. Common examples are the potato "bug" or beetle; the currant worm which defoliates currant and gooseberry bushes twice in the season; the larva of the codling moth, which causes wormy apples; the plum curculio; the tent caterpillar and others.

Insects of this class are destroyed by poisoning their food. The parts of the affected plants consumed are covered with a poisonous substance which is eaten with the plant tissues, causing death. Insects that eat only the foliage are easily destroyed and should cause no great concern. Usually a single

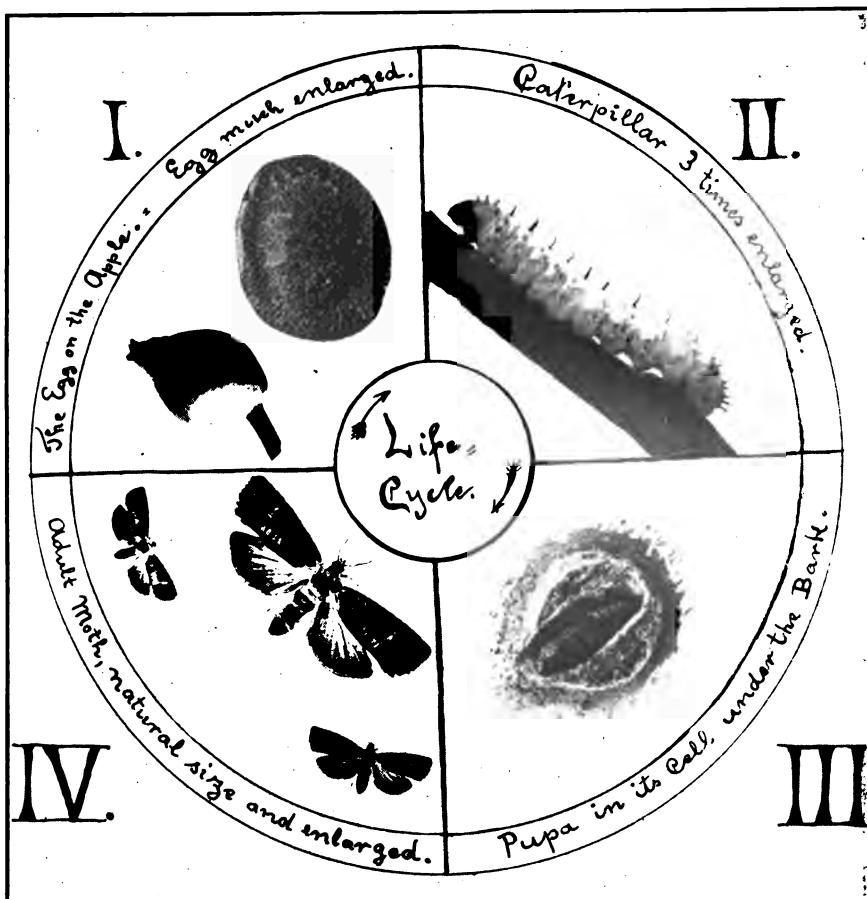


FIG. 1.—Life cycle of codling moth. Prepared by C. E. Bues from photographs furnished by Prof. M. V. Slingerland.

application of paris green or other arsenite is sufficient. Insects that attack the fruit are more difficult to control.

Sucking insects do not consume the external tissues of the plant but feed only on the sap. In order to accomplish this the insect thrusts its proboscis through the external coverings and sucks the juices in the same way a mosquito sucks blood. As these insects do not consume the tissues of the leaf or branch poisons are of no avail. Even if the surface be thickly covered with a layer of poison the aphis will thrust its beak through it as well as through the epidermis of the leaf to reach the plant juices beneath. We must therefore attack the insects. This is done by covering them with some caustic substance which will penetrate their bodies or with an oily substance which closes their breathing spores.

Sucking insects cause less damage in Wisconsin at present than biting insects. To this class belong the numerous aphidae or plant "lice," which attack the young growing shoots of fruit trees, roses, etc. Occasionally nursery stock is injured to some extent by aphids and plum trees are sometimes checked in their growth, but on the whole the injury is slight.

To repeat:

- (1) Biting or chewing insects are destroyed by placing poison on the parts on which the insects feed.
- (2) Sucking insects are destroyed only by attacking the insects and for this class poisons are of no avail.

PLANT DISEASES.

Apples scab, brown rot of plums and peaches, potato rot, blight, rust and other destructive plant diseases are commonly ascribed to weather conditions. *Indirectly* this is often true, but neither rain nor drought, nor any other atmospheric condition is ever *directly* the cause of plant diseases.

*"Such diseases, as already indicated, are produced by minute plants, which never arise spontaneously, but always from some * * * reproductive form of a previously existing plant of the same species. But weather conditions may be favorable to the rapid development of these fungi, and so indirectly cause the disease."

Rainy weather, then, does not directly cause plum rot, but provides conditions favorable to the development of the fungus and probably unfavorable conditions for the development of the plum and its ability to resist the invasion of the disease.

What is a fungus?

It is a plant; a plant without leaves, flowers, seeds, of chlorophyll.*

It cannot therefore prepare its own food, but must feed on other plants.

There are two classes of fungi: saprophytic, which live on decayed or decaying vegetable tissues, toadstools, mushrooms, etc., are examples of this class; and parasitic fungi, which exist on living plants or their fruits, absorbing the prepared nourishment. It is mainly the parasitic class which concerns the fruit grower, for it is this class which causes plant diseases.

Fungi are propagated by spores, minute bodies which may float in the air, and are usually too small to be discerned singly without the aid of a compound microscope; collectively these form a dust-like substance as in bread mold, mildew, etc.

These spores alight on leaf or fruit and under favorable conditions of heat and moisture germinate, giving rise to thread-like projections (hyphae) which penetrate the plant's tissues. These root-like bodies multiply with great rapidity, feeding upon the juices of the affected plant, forming the *mycelium*.

After a time, certain of the modified mycelium (conidia) grow to the surface and produce there spores which are again disseminated. This, in brief, is the life history of a fungous disease. Countless modifications occur with the different species; the spores of some sorts perish soon after dissemination, while others may survive for an indefinite period; some species give rise to two sets of spores, one of which is of brief existence, while the other may persist over winter, etc.

The main fact to be borne in mind is this: The spores which may be present in innumerable numbers may be destroyed or their germination prevented by the application of certain substances known as fungicides *while existing as spores on the outside of plants*, but after the hyphae have penetrated the tissues of leaf, stem or root spraying is of no avail. In other words, spraying for plant diseases must be wholly for prevention.

Laboratory investigations appear to show that the spores of many common fungi are not destroyed by insecticides and that these are effective only in the short time intervening between germination and the entrance into the tissues of the plant by the hyphae.

*Chlorophyll is the green-colored substance found in flowering plants which enables them to change the crude food, i. e., minerals of the soil to nutritive material (plant tissues) that can be used by animals and plants.

INSECTICIDES AND FUNGICIDES.*

No extended list of formulas will be given in the following pages. In fact, out of the long list of remedies published from time to time but two insecticides and one fungicide are now recognized as standard remedies, viz., an arsenical poison for biting insects, kerosene emulsion for sucking insects and some form of copper for fungi.

INSECTICIDES.

(For biting insects.)

Paris Green.

FORMULA.

Paris green	1 lb.
Fresh (unslaked) lime	1 lb.
Water	200 gallons

Paris green is heavier than water and the mixture must be kept in constant motion during spraying operations to prevent settling.

It is often adulterated.

Gypsum and slaked lime are two adulterants commonly used.

Pure Paris green dissolves without sediment in ammonia, the adulterant will not. This affords a simple test for purity.

Paris green if used on growing plants greatly in excess of the above formula may injure the foliage. The addition of the lime overcomes the caustic properties and renders it safe under all conditions.

Dry Paris green may be used pure if applied in small quantities. Different "Dry powder guns" have been invented for this purpose.

Arsenate of Lead.

(A poison for biting insects.)

FORMULA.

Arsenate of lead	2 lbs.
Water	50 gallons

Arsenate of lead is a combination of white arsenic, sugar of lead and sal soda. It may be prepared by combining these materials in proper proportion, but the process involves con-

*"Any substance which is used to destroy or repel insects may be termed an insecticide; and any substance which destroys fungi, or which prevents their injurious growth on vegetation, a fungicide. No substance, so far as known, will answer both purposes equally well."—Lodeman.

siderable labor and danger, as the ingredients must be combined by boiling. At least two firms now offer this valuable insecticide prepared ready for use, viz.:

The Bowker Insecticide Co., Boston, Mass., and The Merrimac Chemical Co., Boston, Mass.

The Bowker Company's preparation is sold as "Disparine" and the other as Swift's "Arsenate of Lead."

Arsenate of lead is less liable to injure foliage than Paris green.

It remains longer in suspension.

It adheres better to foliage.

It may be used for any purpose for which Paris green is employed in liquid sprays. Disparine was used in spraying the Wausau orchard the past season (1904) and with perfect satisfaction.

White Hellebore.

(For biting insects.)

Powered white hellebore is commonly employed to destroy currant and cabbage worms and on fruits and vegetables where more poisonous substances cannot be used with safety.

FORMULA.

White hellebore	1 oz.
Water	2 to 3 gallons

It may also be used dry either alone or mixed with flour, lead plaster, soot, etc.

White hellebore is scarcely poisonous to the higher animals and may be used freely on fruits and vegetables at any stage of maturity.

INSECTICIDES.

Kerosene Emulsion.

(For sucking insects.)

Used only to destroy sucking insects. It must be applied to the insects and cannot be used as a preventive.

This is the standard remedy for sucking insects.

FORMULA.

Dissolve 1 lb. hard soap in 2 gallons of boiling water.

While hot add 2 quarts of kerosene.

Churn or shake the mixture while hot for 5 to 10 minutes or until it assumes a creamy consistency.

Add 6 gallons of water before using.

Another plan consists of using sour milk instead of soap water, the object in either being to hold the kerosene in suspension while it is applied to the insects.

The most approved method of applying kerosene is by means of a special pump designed to mix kerosene and water. These pumps are made by different firms in various sizes from a hand pump or syringe which may be had for 75 cents, to a barrel pump costing \$20.00. This is the cheapest, most agreeable and by all means the best method of applying kerosene.

FUNGICIDES.

The control of fungous diseases is accomplished by the use of some form of copper salts, usually copper sulfate or copper carbonate.

The former, known also as blue-stone, blue vitriol, etc., is generally recognized as more efficient than the latter. When purchased in large quantities it is also cheaper.

Copper sulfate may be used on dormant plants when dissolved in water at the rate of 2 lbs. to 50 gallons of water, but *this solution must not be used on growing plants.*

Copper sulfate in combination with fresh lime forms the standard and well known fungicide.

Bordeaux Mixture.

Various formulas are quoted, but the following is now accepted as safe and reliable:

Copper sulfate	5 lbs.
Fresh lime	5 lbs.
Water	50 gallons

In general terms, the copper sulfate should be dissolved in one-half of the water, the lime slaked in the remainder and the two solutions poured together. This results in a chemical action giving rise to a new substance preserving the fungicidal properties of the copper sulfate and if properly made will not injure foliage.

HELPFUL HINTS IN MAKING BORDEAUX MIXTURE.

- (1) Have on hand three barrels and two pails (wood or fiber).
- (2) Twenty-five gallons of water in each of two of the barrels.

(3) Dissolve 5 pounds of copper sulfate in one barrel by suspending in a coarse burlap as near the surface of the water as possible; in this way it will dissolve in a few minutes, while if allowed to settle to the bottom it would require several hours or even days to dissolve.

(4) Place the lime in a pail and slake by adding water slowly until a paste is formed. (The lime for Bordeaux mixture should be slaked exactly as for building purposes.)

(5) Pour this lime paste into the second barrel and stir thoroughly.

(6) Now pour into the third (empty) barrel first a pailful of the copper sulfate solution then a pailful of the lime water, or better, let two persons work at the job, pouring together.



FIG. 2.—Illustrating method of making Bordeaux mixture. Adapted from Farmers' Bulletin No. 38. B. T. Galloway, author.

(8) The resultant mixture should be of an intense blue color. If any tinge of green appears it is not good Bordeaux mixture.

(9) The lime-water should be strained to remove the coarse particles which serve to clog the nozzles in spraying.

(10) Sufficient lime must be used to combine with all of the sulfate or harm will result. The formula given above provides an excess, but such excess is preferable to a slight deficiency. Use all of the lime water.

(11) Test the mixture. It is always advisable to test every barrel of the mixture before using to detect the presence of any free or uncombined copper which might injure foliage.

TEST NO. I.

Dip a bright, clean steel knife blade into the prepared Bordeaux mixture; if any, even the slightest, deposit of copper ap-

pears on the blade after a few minutes' exposure to the air it is an indication that more lime is needed.

The knife blade should be thoroughly whetted before using for a second test. While this is simple and fairly reliable,

TEST NO. II,

or the ferro-cyanide of potassium test is more accurate.

Ferro-cyanide of potassium may be purchased at any drug store.

Place a small quantity (1 oz.) in a bottle and add water slowly until nearly all of the yellow crystals are dissolved. Stir the Bordeaux thoroughly and dip out a few ounces in a saucer. Add a few drops of the ferro-cyanide solution; if any brown discoloration appears it is an indication that more lime is needed. This is a delicate and reliable test.

The ferro-cyanide is a violent poison and should be labeled as such.

Three Things to Avoid in Making Bordeaux Mixture.

(1) Do not use iron or steel vessels for the sulfate or Bordeaux. Not only will these be corroded but the chemical action resulting from continued contact may injuriously affect the mixture. Tinned or galvanized pails are unsafe, as the zinc or tin coating is apt to be imperfect. Use only wood, copper, earthenware or glass.

(2) Do not dissolve the sulfate and lime each in 2 to 4 gallons of water as formerly recommended and then mix the concentrated solutions; curdling will result and after dilution difficulty will be experienced in keeping the lime and water in suspension.

(3) Do not fail to stir the ingredients while mixing and the resultant mixture when spraying. If allowed to settle the only portion possessing fungicidal value quickly settles.

The Use of Stock Solutions in Preparing Bordeaux Mixture.

If more than one barrel of Bordeaux is required much time may be saved by using stock solutions.

Dissolve 50 lbs., for example, of copper sulfate in 25 gallons of water by suspending in a coarse sack as advised above; slake 50 lbs. of lime in another vessel and dilute to 25 gallons; two and one-half gallons from each stock solution will then contain the requisite amount for one barrel of Bordeaux.

Such stock solutions may be kept indefinitely if covered, otherwise the evaporation of water from the sulfate solution

would result in a more concentrated mixture and the lime would deteriorate. The lime may be covered with water.

The Bordeaux should be tested when made from stock solutions as when made direct.

This method of using stock solutions is now employed in all extensive spraying operations. In some cases large elevated tanks are used, from which the solutions may be drawn directly into the spray barrel or tank.

Carbonate of Copper.

(Used as a preventive of fungous diseases.)

Copper carbonate	3 oz.
Ammonia (22° Baume)	1 quart

Dissolve the copper in the ammonia, which should first be diluted with 7 or 8 quarts of water, and dilute with 25 gallons of water.

The term "22° Baume" is a trade term used to indicate the strong ammonia of commerce.

Neither this nor any other definite formula is recognized as wholly safe.

It is better to add the carbonate to the ammonia, diluted with 7 or 8 volumes of water, until no more will be dissolved.

This solution must then be diluted at least 100 fold before using.

The advantages ascribed to this preparation over Bordeaux are as follows:

(a) It is a clear solution and will not discolor foliage, flowers or fruit and as a consequence may be used on ripening fruit.

(b) It is without sediment.

To offset this is the uncertainty as to the safety of the mixture unless prepared by one skilled in its preparation and the increased cost.

Potassium Sulfid.

(Liver of Sulfur.)

For checking the spread of certain surface feeding fungi, as gooseberry mildew, grape mildew and many of the fungi which cause "damping" of young plants in the seed bed, potassium sulfid may be used to excellent advantage.

FORMULA.

Potassium sulfid	1/2 oz.
Water	1 gallon

The solution must be used as soon as made, as it quickly loses its strength.

COMBINING INSECTICIDES AND FUNGICIDES.

Either arsenate of lead or Paris green may be safely combined with Bordeaux mixture. In fact, in all extensive spraying operations it has come to be a common practice to add arsenical poisons to Bordeaux at every application. By this means biting insects and fungi are controlled at a single operation. No other fact is more important than this in spraying.

Other combinations than the above have been attempted, but with only slight success, as combining kerosene emulsion, Bordeaux and Paris green, etc.

Neither may Paris green be safely used with the ammonical solution of copper carbonate. The caustic effects of this combination in some cases are supposed to result from the action of the ammonia in setting free arsenious acid.

SPRAYING MACHINERY.

The application of spray mixtures necessitates the use of some sort of force pump. Spray pumps and machinery may be divided as follows on the basis of efficiency:

(1) Syringes, atomizers or other like devices known as "hand" sprayers, used to spray house plants and small plants in the garden.

(2) Pumps or devices adapted for small gardens where a few currant bushes, small trees, etc., are grown.

(3) Pumps for general orchard and field work and the spraying of shade trees under 50 feet in height.

(4) Large pumps operated by steam or other power and adapted to any class of work, but designed especially for extensive orchard and park work.

The average Wisconsin farmer or orchardist will seek for a pump either in the second or third class.

In addition to these many machines adapted to special lines of work are offered for sale, as potato sprayers, etc.

(1) The cheapest and simplest of efficient pumps may be found in the first class, viz., "hand" sprayers or atomizers. These sell for 50 cents to \$1.00 and some are very excellent little pumps. Their usefulness, however, is confined to a very narrow field on account of the limited capacity for fluids and the very short distance sprays can be thrown.

(2) In this class are bucket pumps and knapsack pumps, and of these the bucket pump is to be preferred. Trees 10 to 15 feet in height may be sprayed with a bucket pump, also bushes, vines, etc. On some kinds a kerosene attachment

provided, by means of which a mechanical mixture of kerosene and water may be applied to destroy sucking insects. Where but few young trees, bushes, etc., are to be sprayed a bucket pump will answer all purposes, but for extensive orchard work the time employed in refilling the bucket and in transporting the pump and mixture will more than offset the increased cost of a larger pump.

(3) In this class are the various barrel pumps. These are designed to be fitted to an ordinary barrel. This is the most popular kind of pump and it is probable that more of these are used than any other kind. While primarily designed to be



FIG. 3.—Bucket spray pump.

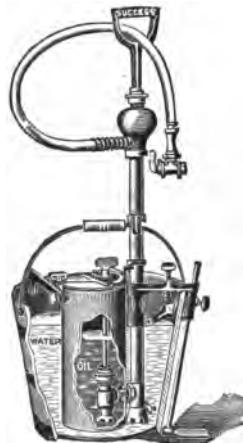


FIG. 4.—Bucket pump with kerosene attachments. The "Success" pumps figured here are made by the Deming Co., Salem, Ohio.

used in a barrel, these may be fitted to a tank or other receptacle.

(4) The large pumps are of interest mainly to park superintendents and owners of very extensive orchards and need not be discussed here.

Prices.

Atomizers, 50 cents to \$1.00.

Bucket pumps, \$5.00 to \$10.00.

Knapsack pumps, \$5.00 to \$15.00.

Barrel pumps, \$10.00 to \$20.00.

Power pumps, with engine, \$150.00 to \$500.00.

With pumps as with other machinery, the best is usually the cheapest in the end. Do not expect to get a servicable pump for a low price. The best pumps have all working parts, valves, plungers and cylinder of brass. A pump that retails for three or four dollars may be of some service in washing windows or carriages, but is of slight value in spraying.

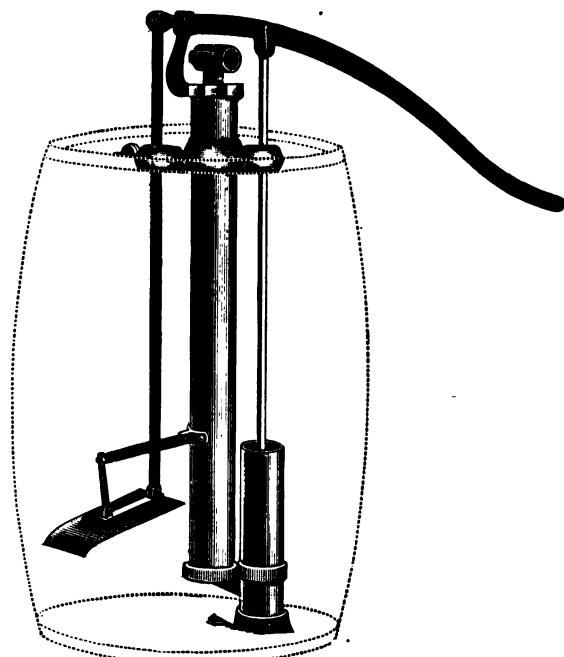


FIG 5.—The "Eclipse" barrel pump. Made by Morrill & Morley, Benton Harbor, Michigan. Other firms offering barrel pumps are as follows: Deming Co., Salem, Ohio; Spramotor Co., Buffalo, N. Y.; E. C. Brown & Co., Rochester, N. Y.; Goulds Mfg. Co., Seneca Falls, N. Y., and others.

Nozzles.

No matter how efficient the pump, good work cannot be accomplished without good nozzles. Many kinds are offered for sale, but of the multitude of forms but two types are in common use. These are represented by the "Bordeaux" and the "Vermorel."

In the former the spray is formed by the fluid being forced against metal obstructions after it leaves the nozzle proper; in the latter a rotary motion is given it within the nozzle, breaking the fluid into extremely fine particles before it leaves the nozzle.

The "Bordeaux" is adapted to use where the spray must be thrown several feet and in windy weather, but it cannot be graduated to produce as fine a spray as the "Vermorel" and is not, therefore, as economical of material as the latter. As nozzles are not a large item of expense in a spraying outfit it is well to have both kinds at hand.

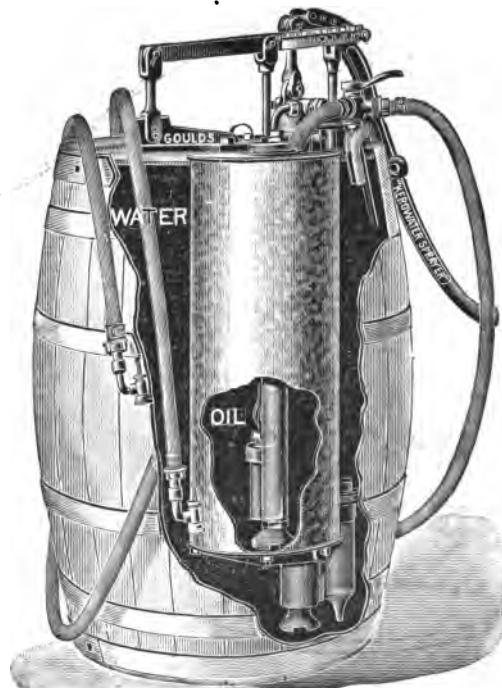


FIG. 6.—"Kerowaer" pump for spraying a mixture of kerosene and water.

Extension Rods. In spraying large trees these are almost a necessity, as by means of a rod the spray may be directed to the inside of the tree, which could not be reached without it except with great loss of material.

A gallon measure made of copper is convenient but not necessary.

A strainer of some sort is always needed to remove coarse particles of lime, etc. Straining through burlap is tedious and expensive.

A large copper funnel with a wire gauze strainer is better than burlap. Hence, nozzles, strainers, rods, etc., may be purchased of firms furnishing spray pumps.

Specific Directions.

The enumeration of the different species of insects and diseases which attack even our common fruits and vegetables can not be attempted in a bulletin. This would require a volume. Therefore, in conclusion, only brief notes regarding apple scab and brown rot among diseases, and the codling moth in insects will be given. Members of this Society are privileged and requested to send to this office at any time specimens of insects or diseases for identification. To insure safe arrival insects should be enclosed in a tin box or stout wooden box and leaves and twigs wrapped carefully in tissue and then in heavier paper.



FIG. 7.—Vermorel nozzle, single.

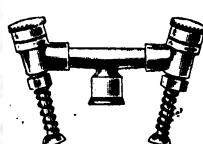


FIG. 8.—Double Vermorel.



FIG. 9.—Triple Vermorel.

FIG. 10.—Extension rod. A brass tube provided with a stop-cock and inserted within a bamboo pole.

Apple Scab.

This disease affects both foliage and fruit, appearing on the former as yellow spots which eventually spread and cause the leaves to fall prematurely. On the fruit it appears as rough brown areas, seriously injuring its keeping qualities and market value.

The spores of this disease live over winter, adhering to the buds and bark as well as the fallen leaves, germinating at the time the leaves start in the spring. It is evident then that the most important spraying for apple scab is in early spring be-

foro the buds open, that we may destroy or prevent the germinu-
ation of the spores. For this spraying copper sulfate may be
used dissolved in water at the rate of 2 lbs. to 50 gallons of water.



FIG. 11.—Strainer.

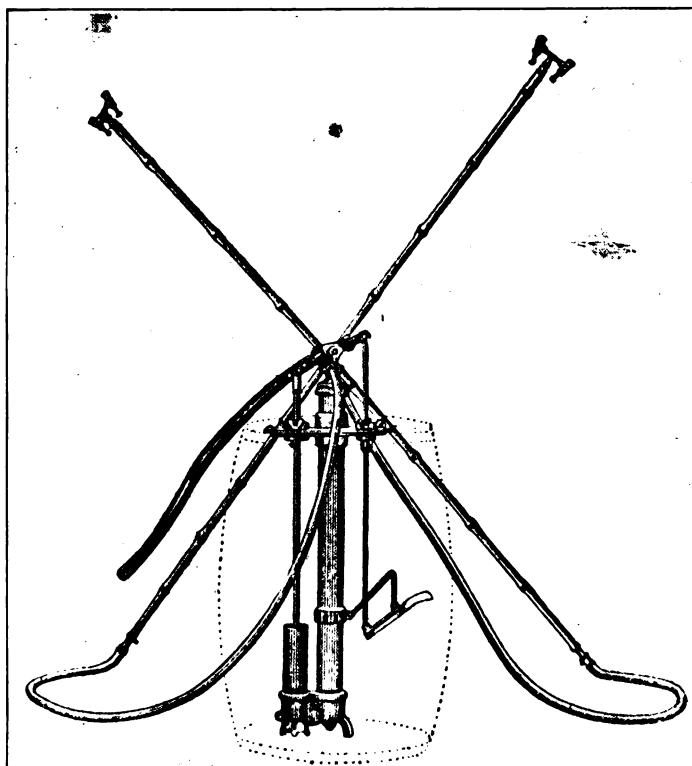


FIG. 12.—A efficient barrel pump equipped with two leads of hose, exten-
sion rods and Vermorel nozzles.

The trees should be sprayed again as soon as possible after the blossoms have fallen and a third time ten days later. Bordeaux mixture should be used for these sprayings, combined with Paris green or arsenate of lead. Do not use copper sulfate on growing trees or plants unless combined with lime.

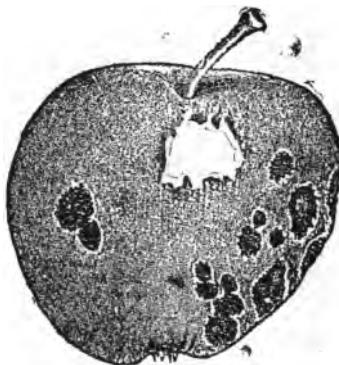


FIG. 13.—An apple affected with scab.

Plum Rot; Fruit Rot; Brown Rot.

This destructive fungus is the most provoking as well as the most destructive of plum diseases. It usually affects the ripening fruit, causing it to decay rapidly while still on the tree. The skins of the affected fruits are covered with grayish protuberances or spore masses which serve to perpetuate the disease.

The spores may gain entrance very early in the season, lodging in the bud scales very early in spring and as the buds open find a congenial field in the growing tissues where they usually exist through the summer, finding their favorite feeding ground in the ripening fruit.

Occasionally, however, it does not wait so long but if the weather conditions are favorable, attacks the blossoms, causing them to decay and may thus wholly prevent the setting of fruit.

Moist, warm weather favors the progress of the disease.

It is probable that this disease may be largely if not wholly controlled by spraying. The first spraying should be done very early in the spring, before the buds open and at this time the copper sulfate solution advised for apple scab may be used. At the close of the blossoming season a thorough application of Bordeaux should be given, and again later in the season if any suspicion exists that the evil has not been overcome.

Where the plums hang on the tree so thickly as to touch, they are apt to rot, as the moisture which collects at the points of contact produces a softening of the tissues which afford an opportunity for the germs to enter. It is advisable then to thin the fruit severely before ripening time.

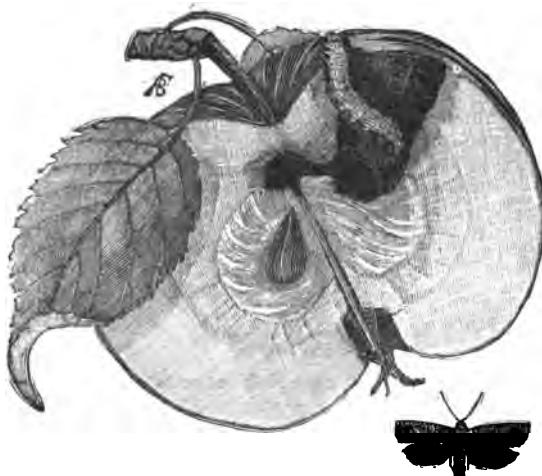


FIG. 16.—Copied from "The Spraying of plants," by Lodeman, and used by permission of the publishers, The Macmillan Co., New York.

Codling Moth. (Fig. 16.)

The mature insect, a night-flying moth, is rarely seen. The first brood of moths appears about the time the blossoms open, arising from cocoons which may be found beneath the roughened bark of old trees or more commonly in the refuse on the ground in neglected orchards. The eggs are deposited soon after the blossoms fall, on the fruit or sometimes on the leaves. The eggs hatch in seven to ten days, and the larva or "worm" finds easy entrance to the interior of the apple at the calyx or blossom end. The remainder of the story is well known; wormy apples are exceedingly common in Wisconsin.

To successfully combat this pest, which in the early stages is a caterpillar scarcely one-sixteenth of an inch long and which at once proceeds to the interior of the fruit, would seem a hopeless task and yet much may be accomplished by timely action.

For several days after the blossoms fall the immature apple retains an upright position on the stem with the calyx lobes spreading outward. This is the time to spray, and in common



1 spraying at Waianae, June 22, 1904.



FIG. 14.—Spraying in the trial orchard at Wausau, April 27, 1904.

FIG. 15.—Third spraying at Wausau, June 22, 1904.



with practically all work of this kind must be preventive. The object to be attained in this spraying is to deposit a drop of poisoned water *in the calyx cavity* and to cover as far as possible the outside of the fruit so that the caterpillar will be obliged to eat the poison in attempting to gain entrance.

After three or four weeks the calyx lobes close and later the little apples turn downward, rendering the proper application of poisons a difficult task. For further security a second application of the poison should be made in eight or ten days, as the egg laying extends over several days.



FIG. 17.—"Just right to spray. A pear and two apples from which the petals have recently fallen. Note that the calyx lobes are widely spread." Illustration and legend copied from Bull. 142, Cornell Univ. N. Y. M. V. Slingerland, author.

In case of heavy rains before the calyx closes, an additional spraying may be necessary. Theoretically, the later the poison is applied, the better, if done *before the calyx closes*. Rains after this period will do but little harm as the poison is protected by a roof formed by the calyx lobes.

The course outlined above would be sufficient to completely rid our orchards of the codling moth in a short time if it were not for the

Second Brood.

Many of the caterpillars of the first brood leave the apples at maturity and sheltered by crevices in the bark or in other secure places complete their transformation to emerge in July or August as moths; these again deposit eggs which enter the fruit when near maturity. Against this brood we are helpless so far as spraying is concerned, but a partial remedy consists in trapping by banding the trees. This consists of placing bands of burlap, cotton or even hay ropes about the trunks of the trees in June or July.



FIG. 18.—"Almost too late to spray apples effectively. Note that the calyx lobes are drawn nearly together, while on the pear in the center, the calyx cavity is open." Illustrations and legend copied from Bull 142, Cornell Univ. N. Y. M. V. Slingerland, author.

The larvae collect beneath these, which should be removed once a week and the caterpillars or pupas destroyed. A majority of the larvae leave the apples before they fall but many remain. It is advisable, therefore, to collect and destroy all windfalls. By those two means we may in a measure prevent the ravages of the second brood and materially reduce the crop of moths which would otherwise hibernate, but in no case should spraying be neglected, and if thoroughly done in proper season there will be no second brood of moths.

Other biting insects which attack the apple are:

Canker worm and tent caterpillar.

Fortunately neither of the two named are common enough in Wisconsin to warrant an extended notice at this time; further, the spraying recommended for the codling moth is sufficient to destroy either or both of these pests as they appear early in the season.

ACKNOWLEDGMENTS.

Figs. 3, 4 and 13 are from The Principles of Plant Culture by E. S. Goff, and used by permission of the publishers, The Co-Operative Pub. Co., Madison, Wis.

Figs. 5, 8, 10 and 11 loaned by Morrill & Morrill, Benton Harbor, Mich.

Fig. 6 loaned by Gould's Mfg. Co., Seneca Falls, N. Y.

Figs. 7, 9 and 12 copied from a trade catalogue.

Fig. 16 copied from Bulletin of Cornell University.

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